FACT SHEET

United States Environmental Protection Agency
Region 10
Park Place Building, 13th Floor
1200 Sixth Avenue, WD-134
Seattle, Washington 98101
(206) 553-1214

Permit No.: ID-002540-2 Date: July 6, 1994

PROPOSED REISSUANCE OF A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE POLLUTANTS PURSUANT TO THE PROVISIONS OF THE CLEAN WATER ACT

THOMPSON CREEK MINE
P.O. Box 62
Clayton, Idaho 83227

has applied for reissuance of a National Pollutant Discharge Elimination System (NPDES) permit to discharge pollutants pursuant to the provisions of the Clean Water Act. This fact sheet includes (a) the tentative determination of the Environmental Protection Agency (EPA) to reissue the permit, (b) information on public comment, public hearing and appeal procedures, (c) the description of the current discharge, (d) a listing of tentative effluent limitations, schedules of compliance and other conditions, (e) a sketch or detailed description of the discharge location, and (f) requirements for sludge management. We call your special attention to the technical material presented in the latter part of this document.

Persons wishing to comment on the tentative determinations contained in the proposed permit reissuance may do so by the expiration date of the Public Notice. All written comments should be submitted to EPA as described in the Public Comments Section of the attached Public Notice.

After the expiration date of the Public Notice, the Director, Water Division, will make final determinations with respect to the permit reissuance. The tentative determinations contained in the draft permit will become final conditions if no substantive comments are received during the Public Notice period.

The permit will become effective 30 days after the final determinations are made, unless a request for an evidentiary hearing is submitted within 30 days after receipt of the final determinations.

The proposed NPDES permit and other related documents are on file and may be inspected at the above address any time between 8:30 a.m. and 4:00 p.m., Monday through Friday. Copies and other information may be requested by writing to EPA at the above address to the attention of the Water Permits Section, or by calling (206) 553-1214. This material is also available from the EPA Idaho Operations Office, 422 West Washington Street, Boise, Idaho 83702.

1. Applicant

Thompson Creek Molybdenum Mine
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Clayton, Idaho 83227

Contact: Bert Doughty, Supervisor
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NPDES Permit No. ID-002540-2

2. Activity

Thompson Creek Mining Company owns and operates an open pit molybdenum mine and concentrator at Thompson Creek in central Idaho. The project operates with a designed annual production rate of 15-20 million pounds of molybdenum in the form of molybdenum disulfide (MoS_2). The project includes: 1) stripping and removal of overburden, 2) disposal and storage of overburden material, 3) an open pit surface mining operation, 4) a 28,000 ton per day (TPD) mill facility, 5) tailings impoundment, 6) support facilities (offices, shops, etc.) and 7) certain transportation elements (roads, conveyor, and pipelines).

The Thompson Creek Project is located in an undeveloped area on both private and Federal lands in Custer County, Idaho approximately 5 miles north of the Salmon River and 35 miles southwest of the county seat of Challis. The project location is shown in Figures 1 and 2. The mine area is situated in fairly rough terrain at a elevation of about 8000 feet while the mill is approximately 1.5 miles southwest of the mine at an elevation of about 7550 feet.

3. Background

A. NPDES Permit

Date	Activity
August 1, 1988	Permit Reissuance Expiration date: August 2, 1993
September 17, 1992	Permit Application for Reestablishment of outfalls 001-003 and establishment of outfall 004 received.
September 7, 1993	An amended NPDES permit application for establishment of outfall 005 to the Salmon River received by EPA. The company requested the additional outfall to discharge excess runoff water buildup as a result of mine shutdown (March, 1993 - April, 1994).
April, 1994	Mine startup operations begin.

B. General Overview

The mine is located on property managed by the U.S. Forest Service (USFS), Challis National Forest, and the Bureau of Land Management. An Environmental Impact Statement (EIS) for the mine was published by the USFS on October 31, 1980. The first NPDES permit was issued on June 10, 1981 and expired June 10, 1986.

4. Project Description

A. Overview

The ore body is mined by conventional open pit methods using electric shovels and haul trucks. Ore is delivered by truck from the mine to the primary crusher located at an elevation of about 7250 feet. According to the company, all active haul roads except roads within the mine pit are sprayed regularly with clean water from the Salmon River to control fugitive emissions. Thompson Creek estimates the final pit will be about one mile wide and a depth of 1200-1500 feet.

The overburden and waste rock removed during mining is placed in dumps located relatively close to the pit. The tops of the dumps are contoured to permit proper drainage. Settling ponds downstream from the dumps, trap sediment from run-off water.

B. Overburden Disposal

The two mine waste rock dumps are located in the Buckskin and Pat Hughes Creek valleys, adjacent to the pit. Sediment ponds constructed (not constructed of waste rock) downstream of each of the waste rock dumps to trap soil and other fines eroded from the dump areas. The quality of the water discharged from the settling ponds is monitored on a continuing basis under the current NPDES permit as outfalls 001 and 002. The waste rock sediment ponds have been designed to store the estimated one year of sediment plus the volume of water from a 10 year 24 hour storm event. An emergency spillway is provided in each pond to pass the 100 year storm event. Outfall points are established below v-notch weirs in the stream channel. Sediment ponds are monitored to ensure that necessary storage capacity for sediment is available. The ponds are dredged when required and the sediment is stockpiled and utilized for reclamation purposes.

The discharges from the two sediment (settling) ponds located in the Buckskin and Pat Hughes creek drainages comprise the existing NPDES outfalls 001 and 002, respectively.

C. Process Design

Mined ore is delivered from the mine to the primary crusher located at an elevation of about 7250 feet. During crushing, the mined ore is reduced in size from 24 inches or greater in diameter to less than 8 inch; grinding then reduces the 8 inch material to a fine powder. This conventional crushing is a dry process carried out without water. In the standard primary crusher, one conical head gyrates within a larger stationary cone to provide the crushing action.

Crushed ore is transported overland by a 60 inch belt conveyor to the concentrator which is situated about 7200 feet east-southwest at an elevation of about 7500 feet. Grinding is normally a "wet" operation where water is added to the crushed ore and is completed in two stages. The first stage is semi-autogenous grinding (SAG) where ore is fed to a rotating drum along with large steel balls to aid in grinding where the rock is not hard enough to function as a self grinding medium. The second stage is ball milling, where ore is fed to a rotating drum containing steel balls as the grinding media.

The slurry mixture of finely ground ore and water next passes to the flotation step wherein the valuable mineral is separated from the waste materials. When mineral particles are coated with certain surface-active chemicals, they will preferentially attach themselves to air bubbles. Flotation is accomplished by bubbling air through the slurry in a series of mechanically agitated cells in the presence of two types of specific surface-active reagents. Some of the reagents promote frothing so the desired mineral floats up with the froth bubbles, while others depress certain minerals and waste so as to minimize their tendency to float. The process is called flotation concentration.

The concentration ratio (i.e the ratio of ore processed to concentrate recovered) is dependent on the actual types of mineral and their degree of dissemination in the ore. Concentration ratios are usually 20-30:1 for zinc minerals, 40-60:1 for copper and 500:1 for molybdenum disulfide. The percentage of mineral recovery also varies with the type and complexity of the ore. In the case of molybdenum ores, recovery can be as much as +90%.

The separated concentrate slurry (solids/water mixture) flows to a thickener in which the solids are allowed to settle to the bottom and excess water is decanted from the top of the thickener tank. In this step the solids concentration is increased from 30-35% to 50-60%. The denser slurry is then pumped from the bottom of the thickener to a filter for further water removal through a cloth medium under vacuum. The resulting filter cake contains about 82-85% solids, or only 15-18% water. The wet cake is dried by heating to a low moisture content of about 5-8% water. The water removed during the thickening and filtering step is recycled for use in the grinding and flotation steps.

D. Tailings Impoundment

The fine ground waste rock and water slurry from the flotation cells, called tailings comprises 30-35% solids and is passed through a pipeline along the main access road to the tailings impoundment area. At the tailings impoundment, the slurry is passed through "cyclones", a water/solid separation and particle size classification device based on centrifugal force. The coarse fraction, or "sands" is deposited via the slurry on the top of the impoundment dam, serving as embankment building material. The fine fraction or "slimes", along with most of the water, is allowed to flow into the impoundment area, or "tailings pond", where the solids settle to the bottom. Water is reclaimed from the tailings pond and pumped back to the grinding and flotation plant.

The tailings impoundment area is centered in the upper Bruno Creek watershed as illustrated in figure 3. The actual impoundment does not capture a large amount of water as the design maximum depth in the pond is about 12 feet. A smaller seepage dam is situated immediately below the tailings dam to collect seepage from the impoundment and utilizes a pumpback system situated below the dam in the center of the Bruno Creek drainage to return water to recycle it to the mill during normal operations (figure 4). A small amount of this water may also be recycled to the tailings impoundment during periods when the mill is inactive. The seepage dam receives water from three sources: the right and left abutment spring water and direct seepage through the impoundment dam. Each side of the dam has segregated drain lines (right and left abutments) that drain to a weir and seepage return dam. There is no discharge of seepage pond water to Bruno Creek. Proposed outfall 004 would only discharge the segregated left abutment spring water to the Bruno Creek drainage.

5. <u>Receiving Water</u>

The mine site is situated within the drainages of three small creeks: Buckskin, Pat Hughes and Bruno Creeks. Buckskin and Pat Hughes Creeks are tributaries to Thompson Creek while Bruno Creek flows into Squaw Creek. Both Thompson and Squaw Creeks flow into the Salmon River at river miles 354.8 and 350.9, respectively. The State of Idaho protects these drainages for the following designated uses: agricultural water supply, cold water biota, salmonid spawning, and secondary contact recreation. The Salmon River at the point of confluence with Thompson and Squaw Creeks is classified as a Special Resource Water and in addition to the designated uses noted above is protected for domestic water supply, and primary contact recreation (Idaho Water Quality Standards and Treatment Requirements, 1992, IDAPA 16,01.2130,01.a.).

Recently, EPA proposed to add Thompson Creek (headwaters to the Salmon River), Squaw Creek (Forest Service Boundary to the Salmon River), and the Salmon River (headwaters to East Fork of the Salmon River) to the list of water quality-limited waters in Idaho. Specifically, it is proposed that these waterbodies be formally listed as water quality-limited for the following parameters:

a. Thompson Creek - sediment and metals.

b. Squaw Creek - nutrients, sediment, flow alteration and metals.

c. Salmon River - sediment

A reopener clause has been incorporated into the proposed permit to allow EPA to reopen the permit to incorporate any applicable effluent limitations and conditions which may result from completed TMDLs on any of these receiving waters.

A. Outfall Summary

Outfall 001 is a weir outfall structure below a small settling pond (1 acre) and collects natural runoff and seepage water downhill from a large waste rock/overburden pile that has filled in a small canyon.

Outfall 002 is much the same as outfall 001, collecting runoff and seepage below a waste rock pile in a small settling pond for treatment before discharge to Pat Hughes Creek drainage for a short distance before entering Thompson Creek. The upper portion of the Pat Hughes drainage has been routed under the waste rock pile and the open pit and emerges below the waste rock pile above the settling pond. No mine drainage water is discharged through this outfall.

Outfall 003 collects stormwater runoff and the diverted natural flow of upper Bruno Creek (upstream from the tailings impoundment) through a 6 acre foot settling pond, then mixing with mine access road runoff which discharges to a 1 acre foot polishing pond and then returns to the Bruno Creek drainage just above the confluence with Squaw Creek. Mine access road stormwater is collected in a ditch that runs along the roadside through the middle of the lower Bruno Creek drainage. The major contributor to the pollutant load is the mine access road since constant truck traffic may keep the turbidity load high when the mine is operating during winter and spring conditions. This discharge classifies as stormwater as the mine road was not constructed from any mining overburden, waste rock, etc. No process water or mine drainage water is used to control dust on the main mine haul road.

Proposed outfall 004 is positioned just below the tailings embankment and would consist of a small amount of seepage from the tailings embankment and a large portion made up of naturally occurring spring water from the "left abutment" of the dam and the upper drainage of Bruno Creek (see figure 4). During normal operations this spring water would be pumped back to the tailings pond above the embankment and recycled to the mill. Currently, a positive water balance exists at the mine due to abnormally wet weather and the shutdown of the mine for economic reasons since December, 1992. When these conditions arise due to shutdown or excessive precipitation it is necessary to discharge excess water to keep the required safety freeboard in the tailings embankment pond to avoid a catastrophic failure of the dam. Springwater from the left abutment (LA) of the dam, contaminated with a small amount of tailings seepage water is proposed to be discharged periodically through outfall 004 to the lower drainage of Bruno Creek. At the proposed point of discharge, Bruno Creek normally has no or little discharge due to the presence of the tailings impoundment dam and seepage return dam in the upper drainage. The actual discharge location of 004 is upstream of the 003 discharge to Squaw Creek.

At the operator's discretion LA water does not have to be pumped back to the tailings pond since it is relatively clean and can easily meet the effluent limitations established for outfalls 001 and 002. Below the tailings embankment there is constant seepage of water below the dam which contains high concentrations of metals from the tailings pond. This water is segregated and routed to a small lined holding pond which does not have a discharge point to Bruno Creek. This process water is always pumped back to the tailings pond and/or recycled to the mill during normal operations.

Proposed outfall 005 is a discharge point that will utilize an existing mine make-up water pipeline that will pump mine water in reverse flow directly to the Salmon River at river mile 354.8 (see Figure 5) just downstream from the confluence with Thompson Creek. The company is installing a custom designed diffuser on the pipeline to allow for increased mixing in the river. The reason for including the proposal for 005 in the permit application was to provide an additional outlet for excess water during periods when the mine is not operating, usually during high runoff periods. Without 005, the proposed outfall 004 alone would not provide enough discharge capacity during these periods of the year. The application for this discharge, however, lists a maximum of 274 - 365 days of potential discharge through 005 at a maximum projected flow of 1.97 million gallons per day (MGD). The source of this water is to be made up of three sources:

- Ground water/runoff water (pitwater) flowing into the open pit mine.

- Left Abutment/natural spring water (LA) mixed with drainage seeping from the tailings pond.

- Pumpback system water (PBS) consisting of spring water mixed with seepage return dam water from below the tailings impoundment collected at a point in the dry Bruno Creek drainage 100 yards below the seepage return pond.

With the exception of the pit water, all other excess water originates from the Bruno Creek drainage and the tailings impoundment pond.

B. Performance/Ambient Monitoring Data

Values in table 1 represent average values for data collected from January, 1989 to September, 1993. Averages of metal concentrations have been calculated using "0" as the real value where the detection limits were reported in the data. Existing permit limitations are included in the table for comparison. Alternative limitations provided for by the existing permit allow the permittee to choose effluent limitations that are based on background metals levels upstream in Thompson Creek. While Bruno Creek is not limited in the existing permit, the monitoring data is included for information purposes.

TABLE 1 (001/002/003) Parameter	Unit	Average Values 1/89 - 9/93			Existing Permit Limit	
		Buckskin Creek 001	Pat Hughes 002	Bruno Creek 003	Avg	Max
Flow (max)	cfs	6.92	3.96	9.93	--	--
TSS	mg/L	7.3	5.1	1.9	20	30
Arsenic	µg/L	0.5	1.5	0.8	--	490.0
Cadmium	µg/L	0.4	0.8	1.6	--	5.3
Copper	µg/L	2.7	0.004	21.0	--	24.5
Lead	µg/L	9.1	4.8	6.7	--	58.9
Mercury	µg/L	2.6	0.2	0.3	--	*2.0
Zinc	µg/L	20.0	29.3	16.0	--	165.0
pH	std unit	8.4	7.7	7.6	6.0	9.0

*Indicates alternative permit limits utilizing background concentrations as described in the existing permit.

The monitoring data indicate there was one violation of permit metals limitations for mercury on one sampling date (4/14/89) in Buckskin Creek which exceeded the permit limit. According to the company, problems with reporting mercury levels may have resulted from inconsistent laboratory results and sampling. One violation of TSS was reported for Pat Hughes Creek on July 15, 1991 at 45 mg/l. No other violations were noted for this period for outfalls 001 and 002.

Table 2 presents average values from the pit water, seepage pond pumpback system, left abutment water, Salmon River (SR2 station) and Squaw Creek (SQ3 station) collected as part of the Water Quality Monitoring Program (11/1993 revision), required by the existing permit (attachment 4), using the same assumptions as Table 1. This data will be used to calculate limitations for outfalls 004 (to Squaw Creek) and 005 (to the Salmon River).

TABLE 2 (004/005)	Units	Average Values 1/89 - 9/93				
Parameter		Left Abutment (LA)	Pit Water (PW)	Pumpback System (PBS)	Salmon River (SR2)	*Squaw Creek (SQ3)
Flow (max)	cfs	2.26	1	0.89	**263.7	**4.6
Flow (avg)	cfs	1.9	0.33	0.17	**241.1	**4.1
TSS	mg/L	6.3	10	4.9	--	--
Arsenic	μg/L	1.3	1.5	0.8	0.75	<5
Cadmium	μg/L	5.3	0.8	1.6	<5.0	4.8
Copper	μg/L	10.5	4.0	21.0	<10.0	5.0
Lead	μg/L	42.7	4.8	6.7	<50.0	<50.0
Mercury	μg/L	0.3	0.2	0.3	0.7	<0.5
Zinc	μg/L	22.0	29.3	16.0	13.0	3.84
pH	std units	6.8	7.7	7.6	7.5	7.5

*Flow data for Squaw Creek utilizes USGS (1973-1992) flow data for the period of record to establish the 1Q10, 7Q10, Harmonic Mean Flow and 30Q5 minimum flows.

**Flow values presented for the Salmon River and Squaw Creek are the 7Q10 (263.7 cfs) and the 1Q10 (241.1 cfs) at USGS stations #13296500 and #13297355, respectively.

6. <u>Basis of Limitations</u>

A. Metals and Other Pollutants of Concern

Sections 301(b), 304, 401, and 402 of the Clean Water Act provide the basis for the limits and other permit conditions contained in the proposed permit. Application of water quality-based limits is authorized under Section 301(b)(1)(c) of the Water Quality Act of 1987, NPDES rules (40 CFR 122.44(d)), and State of Idaho Water Quality Standards and Wastewater Treatment Requirements (IDAPA 16.01.2161 through 16.01.2400).

On December 3, 1982, EPA promulgated effluent guidelines for the Ore Mining and Dressing Point Source Category 40 CFR Part 440 (Subpart (J)). These guidelines establish specific technology-based limitations (BAT) for molybdenum mining and milling. Section 301 of the Clean Water Act requires that more stringent water quality-based limitations be applied when the application of effluent guidelines will not protect for existing state and federal water quality standards. To establish water quality-based effluent limitations (WQBELs) for the proposed permit, EPA considered water quality data from the ambient monitoring program required in the existing permit, Discharge Monitoring Reports (DMRs) submitted by the company, promulgated effluent guidelines, State Water Quality Standards, EPA Quality Criteria for Water and The Toxics rule, Fed. Register vol 57, No. 246, (1992).

1. <u>Flows</u>

Outfalls 001 and 002 [1] - Mine drainage water from the mine waste rock piles located in the Buckskin and Pat Hughes Creek drainages are intermittent in nature and are tributaries to Thompson Creek. Typically, Buckskin Creek flows are generally present only during the months of April, May, and June while Pat Hughes Creek experiences peak flows during May - July and has continuous low flows during the remainder of the year through the period of record. Flows in both drainages are monitored daily under the existing permit. Discharges from both drainages are controlled by instream settling ponds designed to provide for 24hr retention of average springtime flows in addition to the equivalent to the 10 year, 24 hour storm event. Outfall 003 is not limited in the permit, and is monitored for Turbidity weekly during high runoff periods and monthly during the remaining months of the year.

Discharge volumes from outfalls 001 and 002 are not limited since flows originate from in-stream settling ponds that cannot be controlled other than the design features of the retention ponds.

Maximum yearly discharge water flows from Buckskin, Pat Hughes and Thompson Creeks (6.92 cfs and 3.96 cfs) from ambient monitoring from 1988 to 1993 were used to develop the effluent limitations for outfalls 001 and 002. When calculating receiving water quality-based effluent limitations, the 7Q10 flow is normally used. Thompson Creek flows used for the purpose of effluent limit calculation are based on the average maximum yearly flows observed over a 18 year period (1974 - 1992) at the USGS gauging station # 13297330 below Pat Hughes Creek. For the purpose of developing effluent limitations for 001/002 flows in Thompson Creek were derived by the following method. Since the discharges from 001/002 are active

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[1] Outfall 003 is not limited in the existing permit, and is monitored for turbidity weekly during high runoff periods and monthly during the remaining months of the year.

primarily during the months of April, May and June of each year, flows for these months in Thompson Creek were averaged through the period of record (47 cfs). For Human Health considerations 47 cfs is used to calculate limitations since the average flow value is higher than the actual calculated harmonic mean flow for this data.

Outfall 004 - This outfall will receive flows from two sources: Pumpback system (PBS) water and Left Abutment (LA) water from below the tailings impoundment dam (see schematic diagram, figure 4). Outfall 004 discharges to the section of Bruno Creek below the tailings dam which normally has no discharge and is proposed to be used during periods of operation when a positive water balance exists due to excess precipitation or mine shutdown. This excess water would actually be discharged to Bruno Creek upstream of outfall 003. Considering TSS limitations for 004, the additional TSS load/volume from 003 must be considered as commingled with 004 water as an additive load. Table 2 illustrates various flow monitoring results for the PBS and LA discharges. Maximum discharge flows for the LA and PBS water were taken from ambient monitoring data (1989 - 1993). LA water flows generally do not exhibit much variability during any given year, therefore, maximum flow (2.26 cfs) was used to represent the worst case/conservative conditions. Discharge of PBS water through 004 appears to be dependent on current mine operating status/weather conditions at any given time. Again, the maximum flow value (0.89 cfs) was selected for use in deriving effluent calculations. Total flow of the discharge would be 3.15 cfs (LA + PBS). The flows in Squaw Creek were derived form STORET data from USGS measurements for the period of record (1Q10, 7Q10, Harmonic Mean, 30Q5). Two sets of limitations for outfall 004 are proposed to allow for seasonal variability of the flows in the receiving water (Squaw Creek). The more conservative flow analysis recommended by EPA's TSD uses 1Q10 (4.05 cfs), 7Q10 (4.6 cfs), Harmonic Mean (13.07 cfs), and 30Q5 (5.98 cfs) flows (for the months of July through March) while limitations for the months of April, May and June (high flow period) would utilize an average monthly flow for these months, over the period of record at U.S.G.S. Station # 13297355. Average flow for these months over the period of record is 97 cfs. For Human Health considerations 97 cfs is used to calculate limitations since the average flow value is higher than the actual calculated harmonic mean flow for this data. Two sets of limitations for 004, one for the higher discharge season of the year while more stringent limitations would apply at flows less than 97 cfs in Squaw Creek.

Outfall 005 - This discharge point is proposed to receive flows from the LA, PBS system, and Pitwater (PW). The given amounts of water contributed by the LA and PBS sources conform to the same assumptions made for outfall 004. The remaining source of mine wastewater is the PW. The average amount of pitwater available at any time during which the pit pump is operating is constant over an 8 hr period. During periods when there is excess pitwater the pump typically runs in constant 8 hr intervals. Maximum flow reported in the permit application from the pit is 1.0 cfs. The Salmon River 7Q10 receiving water flow was determined from USGS data station #13296500 below Yankee Fork for the entire period of record beginning in 1921. Salmon River flows are: 7Q10 = 264 cfs, 1Q10 = 241 cfs, and Harmonic Mean Flow = 559 cfs, 30Q5 = 293.1 cfs (see Table 2).

2. Metals - Outfalls 001, 002, 004 and 005

A reasonable potential analysis as described in EPA's Technical Support Document for Water Quality-Based Toxics Control, March, 1991, (TSD, Chapter 5) was calculated for all metals present in each outfall (001, 002, 004, and 005) using the monitoring data submitted by the company. Upstream concentrations of metals in Thompson Creek, Squaw Creek and the Salmon River were established from the ambient monitoring program established in the existing permit. All metals data reported for the existing permit were reported as "total". Metals species concentrations that demonstrate a reasonable potential to exceed water quality criteria in the receiving water are limited in the draft permit for each outfall. All effluent limitations were calculated using assumptions based on Gold Book Criteria, (1986), the Toxics Rule, Fed. Register vol 57, No. 246, (1992) and procedures established in EPA's TSD. For the purpose of the proposed permit, only Maximum Daily Limits (MDLs) are applied to discharges 001, 002, and 004 because of the intermittent nature of the discharges during 2 -3 months/year. MDLs and Average Monthly Limits (AML) are applied in the case of proposed outfall 005 due to the potential constant nature of the discharge to the Salmon River.

All metals calculations utilizing procedures described in the TSD set Wasteload Allocations to background concentrations in cases where background exceeds the criteria in the receiving waters (Thompson Creek, Squaw Creek, and the Salmon River). This assumption is made because the existing background concentrations of metals in these receiving streams are due to naturally occurring conditions since there are no man made disturbances/activities upstream.

Outfalls 001 and 002 - As in the existing permit, metals limitations derivations for these discharges are considered as a combined discharge because of the proximity of the discharges to each other and the presence of a single receiving water body (Thompson Creek). Assumptions for these calculations are as follows: 10.9 cfs combined maximum discharge flows (001 and 002), 47 cfs average Thompson Creek flow for the months of April, May and June (1973 - 1992 USGS data), worst case (minimum) hardness 41 mg/l as $CaCO_3$ (1989 - 1983). The 10 year average maximum discharge flow was used for the receiving water and discharge points since discharges 001 and 003 only contribute significant flows during the yearly period of maximum flow in Thompson Creek. Background concentrations of metals in Thompson Creek were established using average values (analyzed as total) reported in the company's ambient monitoring program. Averages were calculated using "0" values where analytical results were reported as below detection limits. Idaho state standards recommend 25% of the receiving stream flow for a mixing zone [Idaho State Water Quality Standards for mixing zones (IDAPA 16.01.2400,03.e.iv.)]. At this percentage, the dilution ratio is ≈1:1.

All metals assumptions, intermediates and calculations are included in Attachment 2. Results of a reasonable potential analysis (described above) to determine the probability of specific metals in the effluent to exceed state water quality criteria at the edge of the mixing zone in Thompson Creek are included in the spreadsheet results presented in attachment 1. Metals limitations in Table 3 are for those specific metals that indicate a reasonable potential to violate state water quality criteria at the edge of the mixing zone in the receiving stream. A summary of monitoring data, aquatic and human health criteria, BAT guidelines, and calculated draft effluent limits are presented in Table 3.

TABLE 3 001 and 002	Monitoring Data µg/l		Federal/Idaho WQ Criteria - µg/l			BAT MDL µg/l	Draft MDL Limits µg/l
Parameter	Maximum Effluent Conc.	Back-ground Conc.	Aq. Life Acute	Aq. Life Chronic	Human Health (10^{-6})		
Arsenic	12.5	0.57	360.0	190.0	0.14	N/A	0.8
Cadmium	8.8	0.44	1.67	0.63	10.0	100	1.1
Copper	26.8	2.5	8.7	6.2	N/A	300	13.2
Lead	77.2	2.6	31.23	1.24	50.0	600	4.3
Mercury	1.86	0.22	2.4	0.012	0.15	2	*0.2
Zinc	82.0	9.1	61.72	55.9	N/A	1500	104.0

* Indicates the limitations calculated in attachment 1 that are less stringent than existing permit limitations for Mercury therefore, because of antibacksliding provisions of the CWA, the

permit limitation for mercury is retained from the existing permit (Table 1) and is presented above.

Table 3 indicates draft water quality-based limitations for Thompson Creek are more stringent than published BAT standards for all selected metals, therefore, more stringent water quality-based limitations shall apply in the draft permit to protect for water quality concerns.

Outfall 004 - Ambient monitoring data collected in Bruno and Squaw Creeks as part of the permit requirements and additional sampling conducted on the Left Abutment water (LA), and Pumpback System water (PBS) was used to develop draft permit limitations for outfall 004 (please see Tables 1 and 2).

Assumptions for these calculations are as follows: 3.15 cfs combined maximum discharge flow (LA + PBS = 3.15 cfs), 1Q10 (4.05 cfs), 7Q10 (4.6 cfs), Harmonic Mean (13.07 cfs), and 30Q5 (5.98 cfs) flows (for the months of July through March), 97 cfs average Squaw Creek flow for the months of April, May and June (1973 - 1991 USGS data), worst case (minimum) hardness 48 mg/l as $CaCO_3$ (1989 - 1983). Background metals concentrations in Squaw Creek were derived by averaging analytical data from 1989 - 1993 using "0" values where results were reported below the detection limit. Maximum effluent concentrations were derived from monitoring data, after removal of outlying values (>50% higher than the next highest value). Idaho state standards recommend 25% of the receiving stream flow for a mixing zone [Idaho State Water Quality Standards for mixing zones (IDAPA 16.01.2400,03.e.iv.)]. At 97 cfs, the dilution ratio is ≈8:1.

All metals assumptions, intermediates and calculations are included in Attachment 2. Results of a reasonable potential analysis (described above) to determine the probability of specific metals in the effluent to exceed state water quality criteria at the edge of the mixing zone in Squaw Creek are included in the spreadsheet results presented in attachment 2. Metals limitations in Table 4 are for those specific metals that indicate a reasonable potential to violate state water quality criteria at the edge of the mixing zone in the receiving stream. A summary of monitoring data, aquatic and human health criteria, BAT guidelines, and calculated draft effluent limits are presented in Table 4.

TABLE 4 Outfall 004	Monitoring Data µg/l		Federal/Idaho WQ Criteria µg/l			BAT MDL µg/l	Draft MDL Limits ≥ 97 cfs* µg/l	Draft AML Limits ≥ 97 cfs µg/l	Draft MDL Limits < 97 cfs µg/l	Draft AML Limits < 97 cfs µg/l
Parameter	Maximum Effluent Conc.	Back-ground Conc.	Aq. Life Acute	Aq. Life Chronic	Human Health (10^{-6})					
Arsenic	11.5	<0.5	360	190	0.14	N/A	6.5	4.5	1.1	0.7
Cadmium	14.5	7.0	2.81	0.9	10.0	100	7	4.8	7	5
Copper	155.0	5.0	13.4	9.17	N/A	300	27.0	18.5	10	7
Lead	1.6	<50	55.94	2.21	50	600	18.2	12.5	2.9	2
Mercury	35.0	<0.5	2.4	0.012	0.15	2	0.2	0.12	0.03	0.02
**Zinc	64.5	3.8	62.83	56.9	N/A	1500	517.0	355	82	56

* 97 cfs average monthly flow in Squaw Creek (April, May, and June)

** Zinc was not a metal that demonstrated a reasonable potential to exceed water quality criteria yet the derived water quality-based limitation is more stringent than BAT. Therefore a water quality based limit for Zinc is included in the proposed permit.

Table 4 indicates draft water quality-based limitations for Squaw Creek are more stringent than published BAT standards for all selected metals, therefore, more stringent water quality-based limitations shall apply in the draft permit to protect for water quality concerns.

Outfall 005 - USGS Salmon River flow data, ambient monitoring data collected in the Salmon River as part of the permit requirements and additional sampling conducted on the Left Abutment water (LA), Pumpback System water (PBS), and open Pit water (PW) was used to develop draft permit limitations for outfall 005 (please see Table 2).

The limits derivation process for a proposed outfall to a special resource water (Salmon River) must follow the rules established under the State of Idaho antidegradation policy. The policy protects/provides maintenance of existing designated uses of all waters of the State of Idaho. The issue of acceptance/or rejection of lesser water quality while still protecting for designated uses should be addressed by the State of Idaho Department of Environmental Quality in agreement with EPA in accordance with Sections 67-2326 of the Idaho State Code pursuant to IDAPA 16.01.2501.

Assumptions for the calculation of limitations are as follows: 4.15 cfs combined maximum discharge flow (LA + PBS + PW = 4.15 cfs), Salmon River 263.78 cfs 7Q10 flow, 241 cfs 1Q10 flow, 559 cfs Harmonic Mean flow (1921 - 1993

USGS data), worst case (minimum) hardness 28 mg/l as $CaCO_3$ (1989 - 1983). Background metals concentrations in the Salmon River were derived by averaging analytical data from 1989 - 1993 using "0" values where results were reported below the detection limit. Maximum effluent concentrations were derived from flow weighted average maximum monitoring data for LA, PBS and PW after removal of outlying values (>50% higher than the next highest value). Idaho state standards recommend 25% of the receiving stream flow for a mixing zone [Idaho State Water Quality Standards for mixing zones (IDAPA 16.01.2400,03.e.iv.)]. This portion of the Salmon River is designated as a special resource water. At a minimum, the state recommended 25% mixing zone was used to represent the most conservative conditions in the river. At this percentage, the dilution ratio is ≈16:1.

All metals assumptions, intermediates and calculations are included in Attachment 3. Results of a reasonable potential analysis (described above) to determine the probability of specific metals in the effluent to exceed state water quality criteria at the edge of the mixing zone in the Salmon River are included in the spreadsheet results presented in attachment 3. Please note that the Human Health criteria for arsenic is established at 0.018 μg/l to conform to the designated uses of domestic water supply and special resource water (Salmon River) under Idaho State rules. Metals limitations in Table 5 are for those specific metals that indicate a reasonable potential to violate state water quality criteria at the edge of the mixing zone in the receiving stream. A summary of monitoring data, aquatic and human health criteria, BAT guidelines, and calculated draft effluent limits (MDLs and AMLs) are presented in Table 5.

TABLE 5 Outfall 005	Monitoring Data μg/l		Federal/Idaho WQ Criteria μg/l			BAT MDL μg/l	Draft MDL Limit μg/l	Draft AML Limit μg/l
Parameter	Maximum Effluent Conc.	Back-ground Conc.	Aq. Life Acute	Aq. Life Chronic	Human Health (10^{-6})			
Arsenic	38.5	<0.75	360	190	0.018	N/A	1.5	0.75
Cadmium	15.4	<5	2.006	0.711	10.0	100	11.6	6
*Copper	28.3	0.0	5.34	3.98	N/A	300	82.9	41.3
Lead	122.6	<50	38.3	1.57	50.0	600	18	9
Mercury	1.49	0.7	2.4	0.012	0.15	2	1.2	0.6
*Zinc	105.6	13.0	39.79	36.01	N/A	1500	428.9	213.8

* Copper and Zinc were not metals that demonstrated a

reasonable potential to exceed water quality criteria yet the derived water quality-based limitations are more stringent than BAT. Therefore water quality-based limit for Copper and Zinc are included in the proposed permit.

Table 5 indicates draft water quality-based limitations for Squaw Creek are more stringent than published BAT standards for all selected metals, therefore, more stringent water quality-based limitations shall apply in the draft permit to protect for water quality concerns.

Detection Level/Compliance Reporting of Metals Results - As a result of the increasing use of water quality-based effluent limits (WQBEL) in NPDES permits, a significant number of permits now contain limits that fall below the capability of current analytical technology to detect and/or quantify specific parameters. EPA's draft "National Guidance for the Permitting, Monitoring, and Enforcement of Water Quality-Based Effluent Limitations Set Below Analytical Detection/Quantitation levels" (March 1994) outlines objectives for achieving consistency in establishing permit pollutant limitations for pollutants that are set below detection levels, taking into consideration the capabilities and uncertainties of currently available analytical methodologies.

EPA's guidance specifies that, regardless of the ability to measure to the level of the WQBEL, the value provided for the maximum and average effluent limits in the permit should be expressed as the calculated WQBELs. The inability to measure to the necessary level of detection is addressed by establishing the Minimum Level (ML[2]) as the quantification level for use in laboratory analysis and for reporting Discharge Monitoring Report (DMR) data for compliance evaluations. In the absence of promulgated MLs, Interim MLs should be used. EPA believes that Interim ML values can be derived most effectively as a multiple of the

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[2] Quantification of measurements below the ML are not acceptable since it requires extrapolation of calibration data to a level below the range of data used to make the original calibration. If analytical results indicate "non-detectable" at or below the ML, those values should be reported as "0". Metals analyses that indicate "non-detectable" at a level above the MDL and ML should be considered invalid. For a detailed description of these terms, definitions, and interim measures, please refer to EPA's Technical Support Document for Water Quality-Based Toxics Control, March, 1991, page 111, and the Draft Final National Guidance for the Permitting, Monitoring, and Enforcement of Water Quality-Based Effluent Limitations set Below Analytical Detection/Quantitation Levels, 3/22/94.

existing Method Detection Limit (MDL) value for a given analyte. The Interim ML is approximated by 3.18 times the published MDL. The Interim ML is then rounded to the nearest whole number for the metal analyte and corresponding specific analytical method approved under Section 304(h). In some cases, MDLs for several metals have not been established. When neither the ML nor the MDL is available, 3.18 times the best estimate of the detection level should be used.

The Agency recommends that reporting requirements in the permits specify that actual analytical results be reported whenever possible. When analytical results cannot be quantified, the Agency recommends reporting zero when results fall below the ML. The recommendations for values less than the ML provide a two-fold advantage: (1) they ensure a margin of relief to the permittee seeking to avoid false positives which lead to violations, and (2) in the cases where the analytical value is non-zero, they provide certainty to the compliance personnel that a violation has indeed occurred where such is noted on the (DMR).

Metals limitations for some specific metals included in the proposed permit for outfalls 001/002, 004 and 005 are set below the EPA analytical method detection limit published in 40 CFR Part 136 (Method 206.2: MDL = 1μg/l). Therefore, reporting metals results with the purpose of satisfying limitations in the proposed permit, the reporting level shall be the minimum level (ML). The ML is the level equivalent to the lowest calibration standard for a specific analytical procedure. In the absence of established MLs, an interim ML can be approximated by 3.18 x the EPA MDL for a specific metal. This result should be rounded to the nearest whole number. In the case of arsenic the ML would be approximated as: 1μg/l * 3.18 = 3.18μg/l. Therefore, the reporting level for Arsenic in the draft permit would be 3μg/l or 0.003mg/l. Table 6 presents calculated MLs for each parameter, EPA sampling methods and corresponding estimated (published) detection limits.

Table 6 Approved Test Methods / Detection Levels / Minimum Levels (µg/l)			
Parameter	Sampling Method	Estimated Detection Level	Interim Minimum Level & Lowest Calibration
Arsenic	EPA Method 206.2 AA Furnace	1	3
Cadmium	EPA Method 200.7, ICP	4	13
Copper	EPA Method 200.7, ICP	6	19
Lead	EPA Method 239.2 AA Furnace	1	3
Mercury	EPA Method 245.2	0.2	1
Zinc	EPA Method 200.7, ICP	2	6

B. TSS

The existing permit contains limitations for TSS (outfalls 001 and 002) that are based on BPT effluent guidelines published in 40 CFR 440.102(h), Subpart J. EPA guidelines establish TSS limitations at 20 mg/l (30 Day Average) and 30 mg/l (Maximum Daily) for discharges from molybdenum ore mining facilities. These limitations are protective of water quality standards in Thompson and Bruno Creeks, demonstrated by facility monitoring data submitted as by the previous permit. Therefore, these limits are retained from the previous permit and are also applied to outfalls 003, 004, and 005.

C. Other Limitations

Effluent pH limitations of 6.0 to 9.0 in the existing permit are fully protective of the beneficial uses of the Salmon River and are in compliance with 40 CFR 133.102. As a result, these limitations are retained in the proposed permit.

Part I.A.2. of the proposed NPDES permit (which requires prohibition of the discharge of floating solids, visible foam, or oily wastes) is required pursuant to the Idaho water quality standards (IDAPA 16.01.2200).

The proposed permit also requires the permittee to operate and maintain the facility such that mining operations do not cause downstream problems.

The permit specifies that the permittee shall not discharge any water not authorized in this permit. This condition is included to ensure that wastewater sources not identified on the NPDES application form are not authorized to be discharged.

7. <u>Basis for Monitoring Requirements</u>

A. Effluent Monitoring

Effluent monitoring is required pursuant to 40 CFR §122.44(i) and is necessary to demonstrate compliance with permit limitations and to evaluate water quality impacts resulting from the discharge. Monitoring frequencies are based on the Agency's determination of minimum sampling frequency required to adequately monitor plant performance. Required sample types are based on the Agency's determination of the potential for effluent variability. The effluent samples shall be collected at the locations designated in the permit application, without dilution from any outside sources.

Monitoring results will assist EPA in evaluating the effluent's impact on the receiving water. In addition, effluent limitations for future NPDES permits will be derived using the effluent and instream monitoring data. The monitoring frequencies for those outfalls limited in the proposed permit are summarized in Table 7:

TABLE 7 - Effluent Monitoring Requirements Summary: Outfalls 001/002/004/005			
Parameter	Frequency: 001/002	Frequency: 004/005	Sample Type
Flow	Continuous	Continuous	Recorder
TSS	Weekly	Weekly	Composite
pH	Weekly	Daily	Grab
Arsenic	Monthly	Weekly	Grab
Cadmium	Monthly	Weekly	Grab
Copper	Monthly	Weekly	Grab
Lead	Monthly	Weekly	Grab
Mercury	Monthly	Weekly	Grab
Zinc	Monthly	Weekly	Grab

Monitoring frequencies for outfalls 004 and 005 have been established at once per week during periods of discharge. Weekly monitoring for the metals selected above for these discharges is important when considering the sensitivity of the receiving waters (Squaw Creek and the Salmon River). Protected uses dictate the necessity for more frequent monitoring during periods of constant discharge compared to the seasonal discharges from 001 and 002. All effluent monitoring results shall be reported as "total recoverable".

B. Ambient Monitoring

The permittee is required to conduct ambient monitoring to evaluate the water quality impacts of the project. Moreover, 40 CFR §122.44(i)(1) states that NPDES permits shall include monitoring requirements to ensure compliance with permit limits. Ambient instream parameters monitored are used for analyses of pollutant loadings, and ensuring compliance with the Idaho water quality standards.

The current permit requires ambient monitoring of Buckskin, Pat Hughes, Thompson, Bruno, and Squaw Creeks. In the proposed permit the permittee shall continue to provide for water quality monitoring in accordance with the Cyprus Thompson Creek Water Quality Monitoring Program established in 1987 and modified in November, 1993 by the USFS and the permittee. The major areas of coverage include:

1. Surface water quality of Thompson, Squaw Creek and the Salmon River drainages.

2. Quantity and quality of effluent released from the settling ponds in the Buckskin and Pat Hughes Creek drainages (outfalls 001 and 002).

3. Surface water quality in the tailings impoundment drainage basin.

4. Fish and invertebrate populations of all streams draining the active mine and operations areas.

The Thompson Creek Ambient Monitoring Program (11/93) is summarized in attachment 4. Portions of this monitoring program address quarterly monitoring (reported in March, June, September and December) of water quality trends based on the discharges from outfalls 001 and 002 into Thompson Creek and possible seepage from the tailings impoundment area to Squaw Creek. The existing program includes sampling stations adequate to characterize water quality as result of outfall 004 since the discharge would be to the Bruno Creek drainage, above outfall 003. The establishment of the proposed outfall 005 to the Salmon River in the proposed permit poses an additional water quality monitoring burden on the permittee. Representative ambient sampling stations were recently established in the Salmon River upstream of the proposed discharge 005 and the confluence with Thompson Creek and upstream and downstream of the Squaw Creek confluence. These three new ambient sampling stations are included in the amendments to the Water Quality Monitoring Program (11/1993). The minimum monitoring requirements for stations on the Salmon River are described in Table 8.

Table 8 summarizes the minimum parameters to be analyzed quarterly at ambient stations in *Thompson, and *Squaw Creeks and the Salmon River. All ambient monitoring results shall be reported as "total recoverable".

* Sampling stations TC-1, TC-4, SQ-2, SQ-3, SQ-4, SR-1, SR-2, and SR-3 (see attachment 4).

Table 8 - Ambient Monitoring Stations Summary

Parameter	Units	Frequency	Type
Flow	cfs	Quarterly	Grab
Conductivity	µmhos/cm @25°C	Quarterly	Grab
Alkalinity	mg/l as $CaCO_3$	Quarterly	Grab
Hardness	mg/l as $CaCO_3$	Quarterly	Grab
pH	standard units	Quarterly	Grab
Dissolved Oxygen	mg/l	Quarterly	Grab
Temperature	°C	Quarterly	Grab
TSS	mg/l	Quarterly	Grab
Turbidity	NTU	Quarterly	Grab
Aluminum	µg/l	Quarterly	Grab
Arsenic	µg/l	Quarterly	Grab
Cadmium	µg/l	Quarterly	Grab
Copper	µg/l	Quarterly	Grab
Lead	µg/l	Quarterly	Grab
Mercury	µg/l	Quarterly	Grab
Zinc	µg/l	Quarterly	Grab

Ambient dissolved oxygen (DO) monitoring is included in the proposed permit since adequate DO levels are essential to fish migration, spawning, and rearing. In addition to the quarterly DO monitoring in the Salmon River, additional weekly DO monitoring is required in the proposed permit on all Salmon River stations during periods of discharge from 005.

C. Toxicity Testing

In accordance with 40 CFR 122.44(d)(1), EPA is required to evaluate a discharge for its reasonable potential to cause or contribute to an instream excursion above narrative water quality criteria (IDAPA 16.01.2003,20). In addition, toxicity testing is required to determine compliance with water quality standards. In order to further assess the discharge, whole effluent toxicity testing has been incorporated into the proposed permit. The required toxicity testing program is aimed at determining acute and chronic biological effects of the discharges. Similar toxicity testing has been widely used by the Agency in ambient monitoring studies and has been required in other NPDES permits.

The pollutants of concern at the facility are currently being regulated through chemical specific limits. However, these controls alone cannot assure that complex effluent effects are not occurring. As a result, the facility will be required to conduct whole effluent toxicity screening tests two times per year at each outfall. These tests will be to establish the chronic toxicity levels of the effluent using two bioassays: Pimephales promelas (fathead minnow) - static renewal, larval survival, and growth tests; and three brood, seven-day chronic cladoceran Ceriodaphnia dubia (daphnia), static renewal, survival, and reproduction tests.

The objective of the tests is to have effluent concentrations in the receiving stream less than the known toxic effects concentration. This can be expressed as follows:

$$\text{IWC} \leq \text{NOEC}$$

where,

IWC = the instream waste concentration or the concentration of effluent in the receiving stream after mixing, and

NOEC = the no observed effect concentration or the highest measured concentration of effluent that causes no observed effect on a test organism.

Both IWC and NOEC are expressed as percent effluent. The higher the IWC, the greater the percentage of effluent in the receiving water. If the above equation is satisfied, then the receiving stream is protected against aquatic toxicity.

The proposed permit has established the IWCs, for the Thompson Creek Mine discharges 001/002, 004 and 005, at the following percentages of effluent:

Outfall 001/002: IWC = 48%

Outfall 004 $\geq$ 97 cfs: IWC = 11%
< 97 cfs IWC = 73%

Outfall 005: IWC = 6%

These percentages are based on the dilution available in the receiving waters for each outfall. The 25% mixing zone is based on the Idaho State Water Quality Standards for mixing zones (IDAPA 16.01.2400,03.e.iv.). The state standard allows 25% of the receiving stream flow for a mixing zone.

The IWC is calculated as follows:

$$IWC = \frac{Q_{effluent}}{25\% Q_{stream} + Q_{effluent}}$$

where,

$Q_{effluent}$ = effluent flow, and

Q_{stream} = receiving water flow.

therefore,

$$IWC = \frac{10.9 \text{ cfs}}{(.25)47 \text{ cfs} + 10.9 \text{ cfs}} = 0.48 = 48\% \quad \text{Outfall 001/002}$$

$$IWC = \frac{3.15 \text{ cfs}}{(.25)97 \text{ cfs} + 3.15 \text{ cfs}} = 0.115 = 11\% \quad \text{Outfall 004} \geq 97 \text{ cfs}$$

$$IWC = \frac{3.15 \text{ cfs}}{(.25)4.6 \text{ cfs} + 3.15 \text{ cfs}} = 0.732 = 73\% \quad \text{Outfall 004} < 97 \text{ cfs}$$

$$IWC = \frac{4.15 \text{ cfs}}{(.25)263.78 \text{ cfs} + 4.15 \text{ cfs}} = .06 = 6\% \quad \text{Outfall 005}$$

The proposed permit requires testing of the effluent (at outfalls 001/002, 004(< 97 or $\geq$ 97 cfs and 005) a minimum of 2 times each year. If the NOEC is less than or equal to 48%, 11%, 73% or 6% respectively, then the permittee must conduct six accelerated tests for each outfall concerned.

If acute toxicity is demonstrated during the chronic tests, the permittee is required to report the LC_{50}. The LC_{50} is the pollutant concentration at which 50 percent of the test organisms are killed. If acute toxicity is demonstrated at a dilution of less than or equal to (Outfalls 001/002) 25%, (Outfall 004) 9.3% or (Outfall 005) 6%, then six accelerated acute tests are required.

The toxicity tests shall include a series of dilutions from control water to 100 % effluent such that it includes the expected dilutions at each outfall: (Outfalls 001/002) 48%, (Outfall 004) 11% & 78% or (Outfall 005) 6% effluent concentration after dilution.

If the accelerated testing also indicates the acute or chronic toxic effects of the effluent, EPA will evaluate the data to determine what appropriate enforcement response may be necessary.

8. Site Management Pollution Prevention Plan

Section 402 (p)(2)(B) of the Clean Water Act (CWA) requires EPA to include conditions in the NPDES permit that require the permittee to develop a Best Management Practices (BMP) plan. The BMP Plan will be used to control the discharge of toxics or hazardous pollutants by way of spillage or leaks, sludge or waste disposal, and drainage from raw material storage. Additionally, section 402(p)(2)(B) of the CWA requires EPA to address storm water discharges associated with industrial activities within the framework of the NPDES permitting process. EPA is authorized under 40 CFR 122.44(k)(2) to impose BMP's in lieu of numeric effluent limitations in NPDES permits when the Agency finds numeric effluent limitations to be infeasible. Storm water conditions have been incorporated into the BMP Plan.

The intent of the BMP Plan is to recognize the hazardous nature of various substances used and produced by the facility and the way such substance may be accidentally dispersed. The BMP Plan should incorporate elements of pollution prevention as set forth in the Pollution Prevention Act of 1990, 42 U.S.C. 13101.

The BMP Plan must be amended whenever there is a change in the facility or in the operation of the facility which materially increases the potential for an increased discharge of pollutants. The BMP Plan will become an enforceable condition of the permit. A violation of the BMP Plan is a violation of the permit.

9. Quality Assurance Requirements

40 CFR §122.41(e) requires the permittee to properly operate and maintain all facilities which are used by the permittee to achieve compliance with the conditions of the permit. It requires the permittee to ensure adequate laboratory controls and appropriate quality assurance procedures.

The proposed permit requires the permittee to develop Quality Assurance Project Plans (QAPPs) in accordance with EPA-approved quality assurance and quality control (QA/QC) procedures. The permittee is required to ensure the data quality of its contract laboratories. The permittee shall submit its QAPPs to EPA and IDEQ for review and approval.

The permittee shall amend the QAPPs, whenever there is a modification in the sample collection, the sample analysis, or any conditions/requirements that is not specified in the existing QAPPs. The conditions and requirements specified in the QAPPs are part of the permit. Non-compliance with the conditions and requirements of the QAPPs shall constitutes non-compliance with the permit.

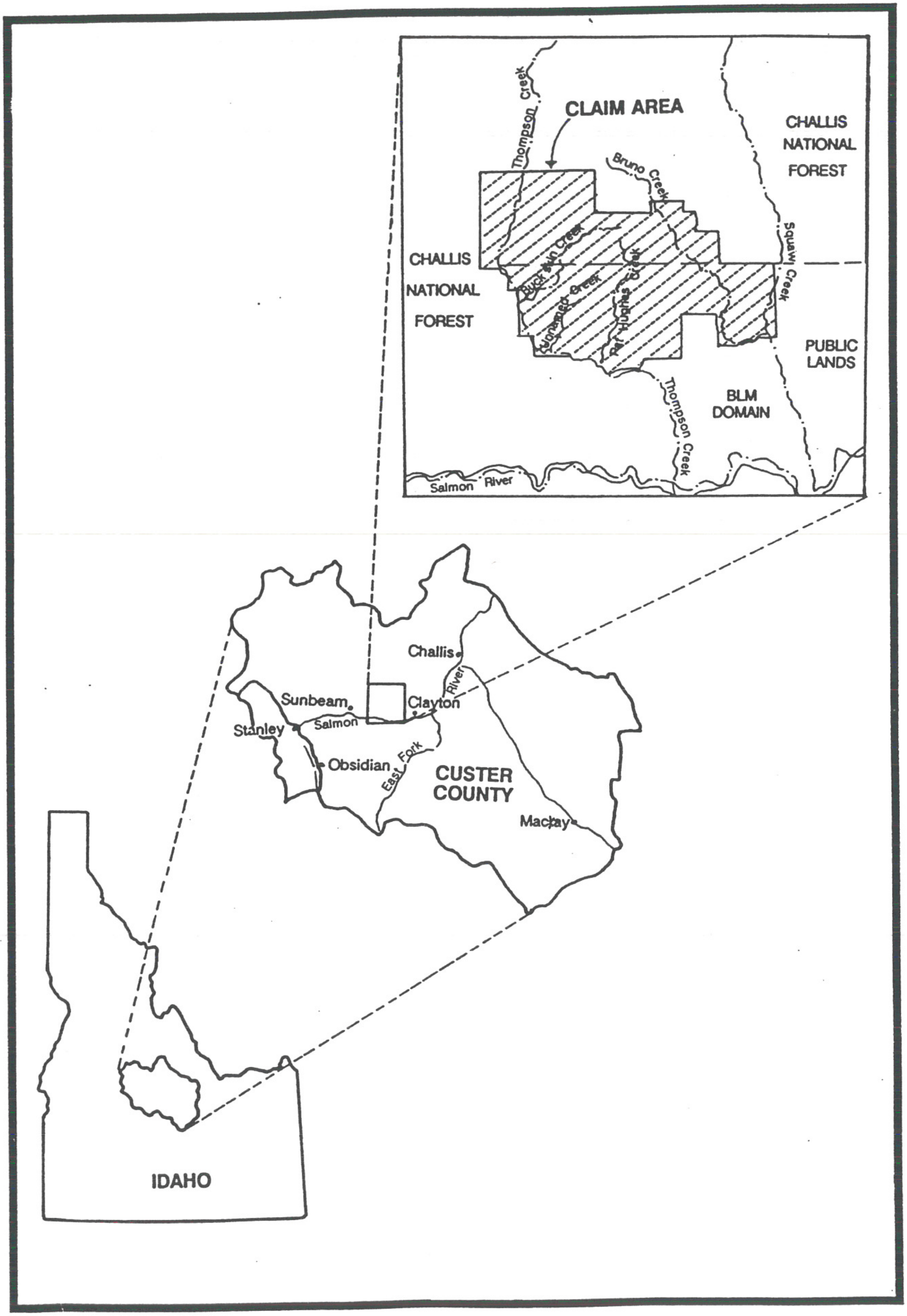
10. <u>Endangered Species Act Consultation</u>

An endangered species list was requested by EPA and received from the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (USFWS) on May 10, 1993 and June 23, 1994, respectively. Two listed fish species, Chinook Salmon, and Sockeye Salmon were included as potentially impacted freshwater fish in the area of the Thompson Creek mine facility discharge. The USFWS also listed the Gray Wolf as a potentially impacted species. A draft Biological Evaluation (BE) was contracted by the permittee concerning all the listed species, and shared with USFWS. Comments were received from the Service resulting in revisions to the document. EPA has forwarded the revised document to both Services for their review. EPA will consider the Services' comments in developing the final permit.

11. <u>Information for Other Conditions</u>

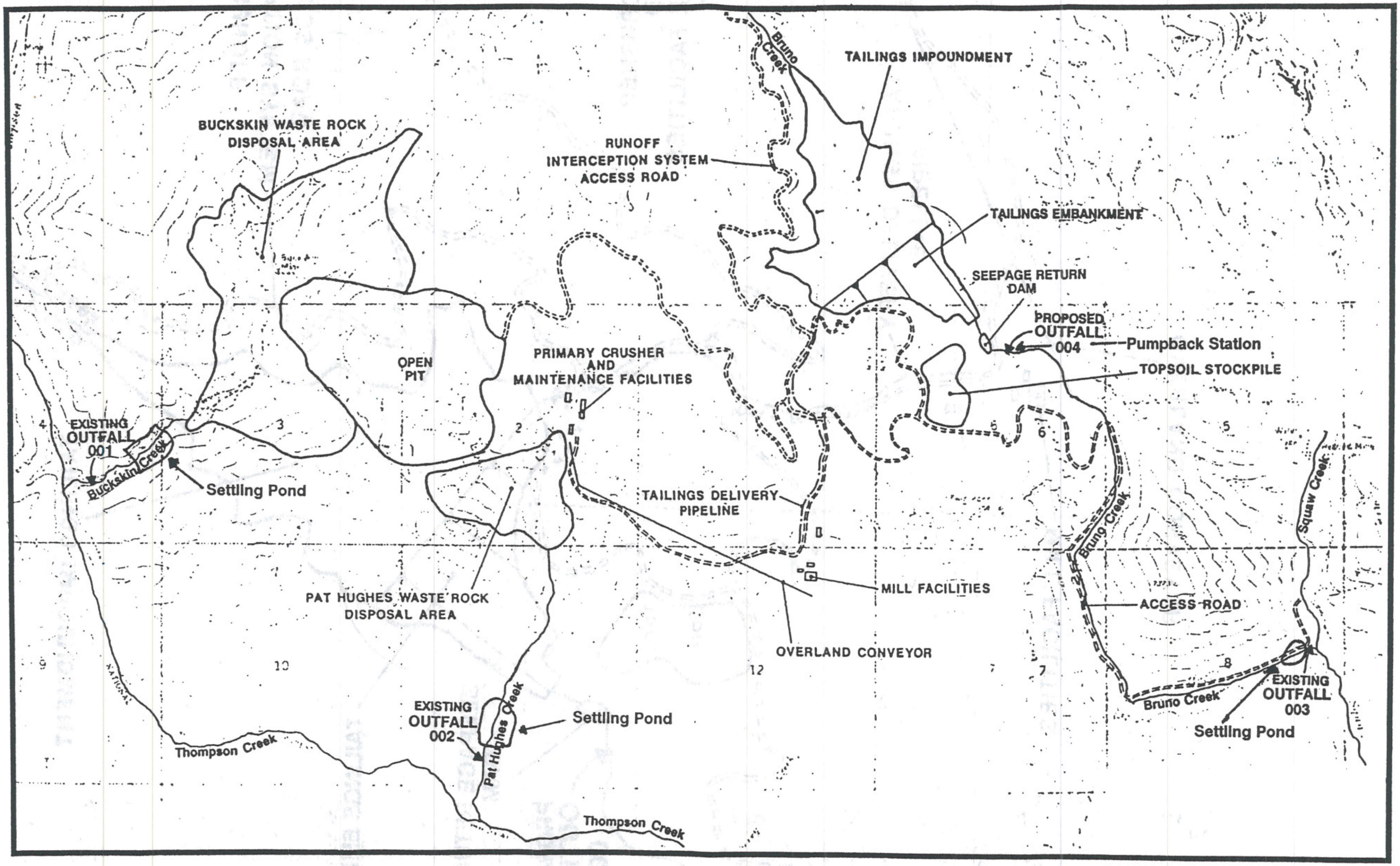
This permit, as proposed, would expire five years from the effective date.

Figure 1



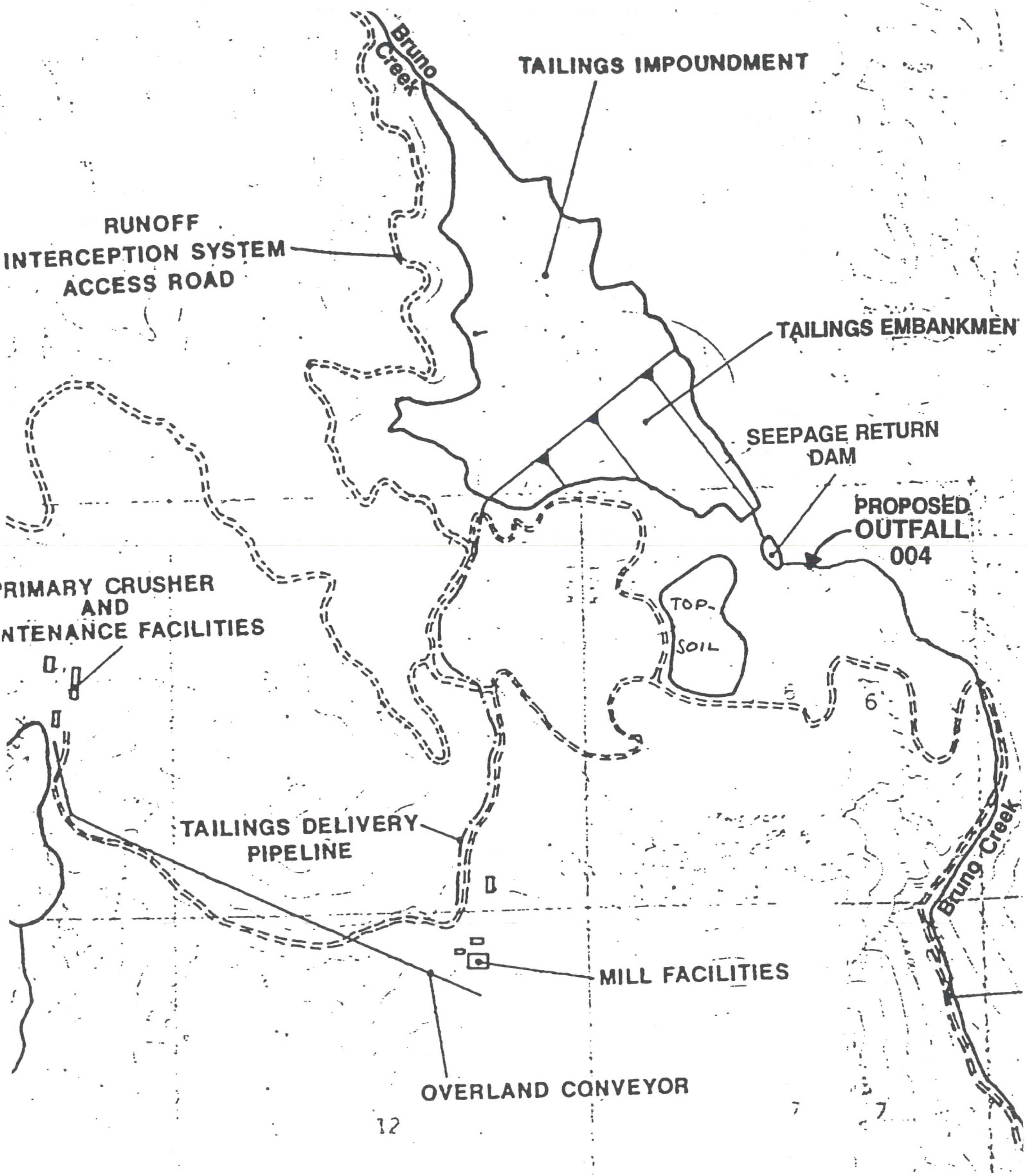
CLAIM AREA
Thompson Creek
Bruno Creek
Buck Skin Creek
Unnamed Creek
Pat Hughes Creek
Squaw Creek
CHALLIS NATIONAL FOREST
CHALLIS NATIONAL FOREST
PUBLIC LANDS
BLM DOMAIN
Thompson Creek
Salmon River
Challis
River
Sunbeam
Clayton
Stanley
Salmon
Obsidian
East Fork
CUSTER COUNTY
Mackay
IDAHO

Figure 2



TAILINGS IMPOUNDMENT
Bruno Creek
BUCKSKIN WASTE ROCK DISPOSAL AREA
RUNOFF INTERCEPTION SYSTEM ACCESS ROAD
TAILINGS EMBANKMENT
SEEPAGE RETURN DAM
PROPOSED OUTFALL 004
Pumpback Station
TOPSOIL STOCKPILE
OPEN PIT
PRIMARY CRUSHER AND MAINTENANCE FACILITIES
EXISTING OUTFALL 001
Buckskin Creek
Settling Pond
TAILINGS DELIVERY PIPELINE
Bruno Creek
Squaw Creek
MILL FACILITIES
ACCESS ROAD
PAT HUGHES WASTE ROCK DISPOSAL AREA
OVERLAND CONVEYOR
EXISTING OUTFALL 003
Settling Pond
Bruno Creek
EXISTING OUTFALL 002
Settling Pond
Pat Hughes Creek
Thompson Creek
Thompson Creek

Figure 3



Bruno Creek
TAILINGS IMPOUNDMENT
RUNOFF INTERCEPTION SYSTEM ACCESS ROAD
TAILINGS EMBANKMEN
SEEPAGE RETURN DAM
PROPOSED OUTFALL 004
TOP-SOIL
PRIMARY CRUSHER AND MAINTENANCE FACILITIES
6
TAILINGS DELIVERY PIPELINE
Bruno Creek
MILL FACILITIES
OVERLAND CONVEYOR
12
7

Figure 4

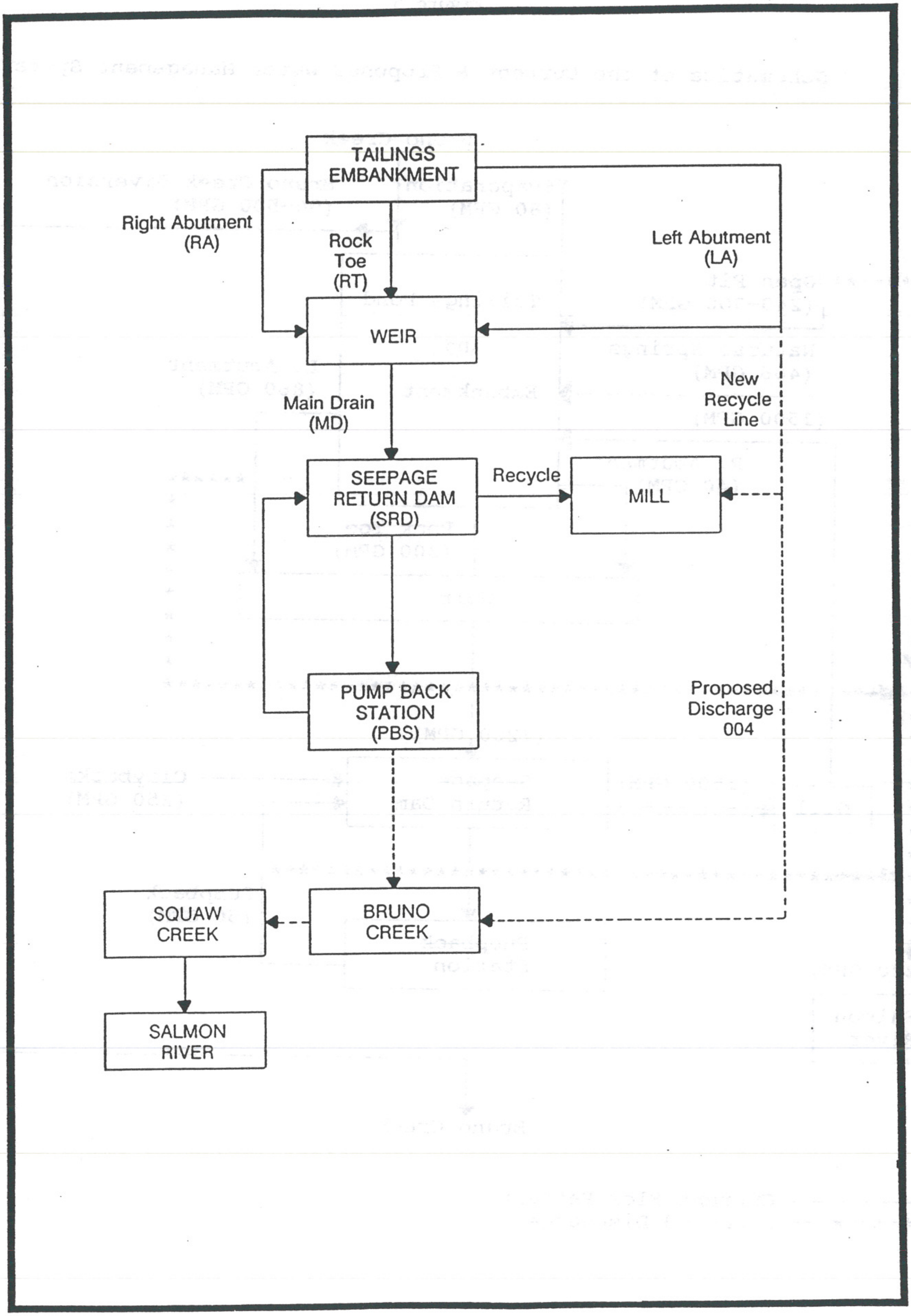
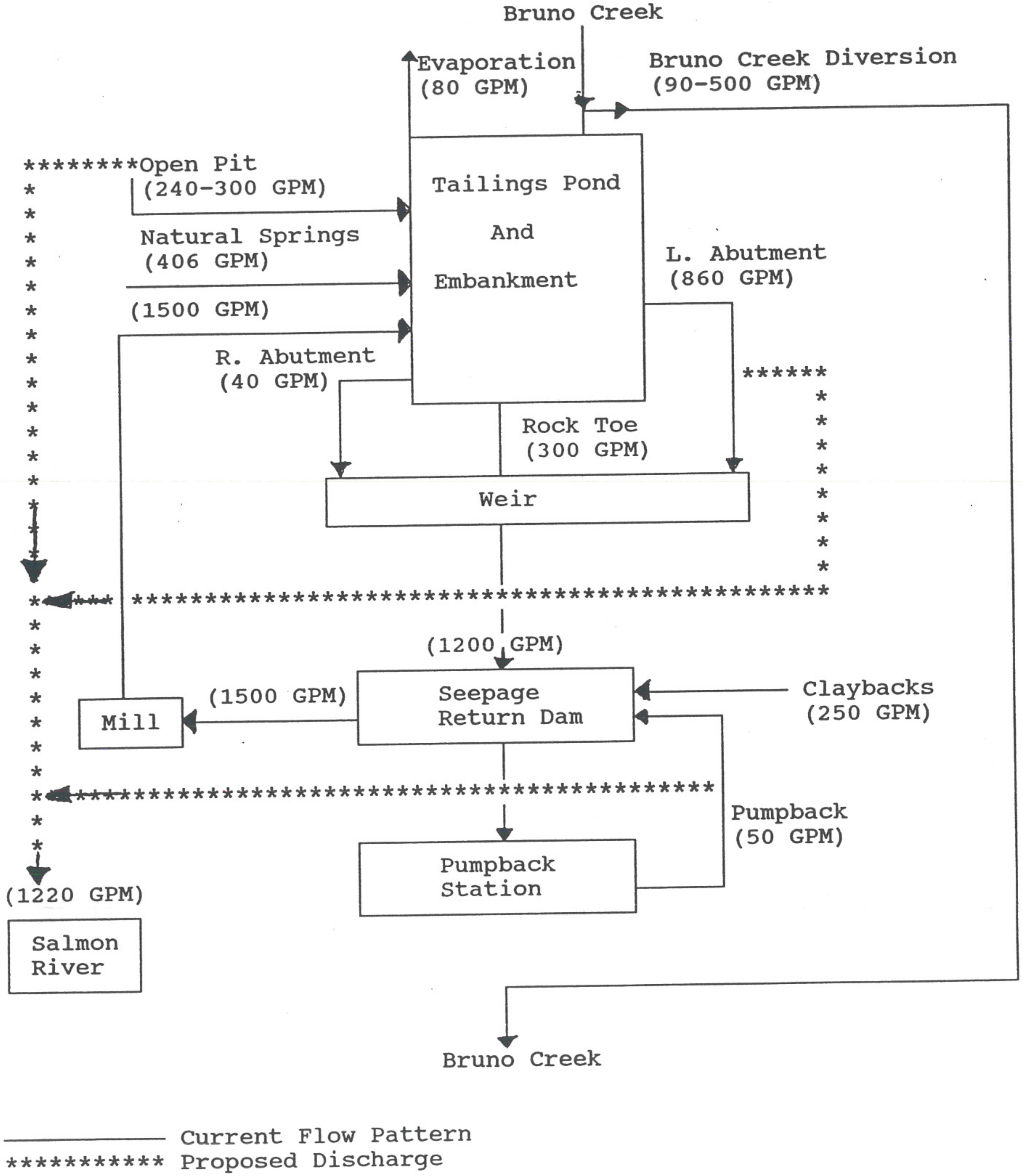

TAILINGS EMBANKMENT
Right Abutment (RA)
Rock Toe (RT)
Left Abutment (LA)
WEIR
Main Drain (MD)
New Recycle Line
SEEPAGE RETURN DAM (SRD)
Recycle
MILL
PUMP BACK STATION (PBS)
Proposed Discharge 004
SQUAW CREEK
BRUNO CREEK
SALMON RIVER

Figure 5

Schematics of the Current & Proposed Water Management System



Attachment 1

IDAHO FRESHWATER WATER QUALITY-BASED PERMIT LIMITS SPREADSHEET - REGION X

DRAFT

06/15/94

Please Provide The Following Required Information:

1) NPDES Permit Number: ID-0020540-3

2) Facility Name: Cyprus Thompson Creek Molybdenum Mine, Clayton, Idaho

3) Outfall Number (include a ' prior to number): 001 and 002

4) Maximum Effluent Flow
- 4a) Will The Units Be In MGD or CFS ([M] or [C])? C
- 4b) Enter the Flow: 10.9

5) Receiving Water Parameters (Freshwater)
- 5a) pH: 7.18
- 5b) Temperature (oC): 4.8
- 5c) Hardness (mg/L CaCO3): 41

6) [D]ilution (w/mixing zone) or [R]iver Flow? R

Enter Percent of Flow for Mixing Zone

6a)	Units In MGD or CFS ([M] or [C])?	C<- Enter Here		
6b)	Will Mixing Zone Be Allowed ([Y] or [N])?	Y<- Enter Here		
6c)	Aquatic Life Acute (1Q10):	47	6g) % Available:	25
6d)	Aquatic Life Chronic (7Q10):	47	6h) % Available:	25
6e)	Human Health - Carcinogens (Harmonic Mean):	47	6i) % Available:	100
6f)	Human Health - Non-Carcinogens (30Q5):	47	6j) % Available:	100

7) Desired Percentile Occurrence Probability for WLA and MDL Multipliers (Enter "95" or "99" in Each Cell Below):
- 7a) Aquatic Life Acute WLA Multiplier Percentile: 99
- 7b) Aquatic Life Chronic WLA Multiplier Percentile: 99
- 7c) Aquatic Life Multiplier/Max Daily (MDL): 99
- 7d) Aquatic Life Multiplier/Avg Monthly (AML): 95
- 7e) Human Health Multiplier/Max Daily (MDL): 99
- 7f) Human Health Multiplier/Avg Monthly (AML): 95

8) Acute to Chronic Ratio (default = 10) for Whole Effluent Toxicity: 10

9) HIT ALT-A OR ALT-B TO CONTINUE DATA ENTRY
HIT ALT-R TO RETURN TO THIS SCREEN
HIT ALT-P TO PRINT SPREADSHEET
HIT ALT-H FOR HELP SCREEN

POLLUTANTS	MOST STRINGENT OF THE CRITERIA & STANDARDS			EFFLUENT AND RECEIVING WATER CHARACTERISTICS (USER INPUT)				
{Commonly Encountered Pollutants} This list does not contain all Gold Book Criteria and Idaho W.Q. Standards [Enter non-listed pollutants manually]	Aquatic Life Acute (ug/L)	Aquatic Life Chronic (ug/L)	Human Health (ug/L)	Effluent Max. Conc. (ug/L)	Number of Effluent Samples Collected (n)	Coeff. of Variation (CV)	Reasonable Potential Multiplier	Receiving Water Upstream Conc. (ug/L)
METALS								
Arsenic (c)	360.00	190.00	0.14	12.50	90.00	0.60	2.30	0.57
Cadmium (H)	1.43	0.56	10.00	8.80	90.00	0.60	2.30	0.44
Copper (H)	7.65	5.52	NA	26.80	90.00	0.60	2.30	2.50
Lead (H)	26.24	1.04	50.00	77.20	83.00	0.60	2.30	2.60
Mercury	2.40	0.01	0.15	1.86	88.00	0.60	2.30	0.22
Zinc (H)	54.98	49.79	NA	81.92	90.00	0.60	2.30	9.10

!!! HIT ALT-B TO CONTINUE DATA ENTRY !!!

! = Permit limit recommended
NA = No Available Std or Criterion
MDL = Maximum Daily Limit
AML = Average Monthly Limit
Caution** This spreadsheet set WLA to Background from TUa using the ACR
TUc = Chronic Toxic Units
TUa = Acute Toxic Units
pH = pH dependent
H = Hardness dependent
c = Carcinogen
* = For use in interpreting

POLLUTANTS	MAXIMUM PROJECTED RECEIVING WATER CONCENTRATION (based on reasonable potential multiplier)			WASTELOAD ALLOCATION			CALCULATION OF LONG-TERM AVERAGE FOR AQUATIC LIFE		
{Commonly Encountered Pollutants} This list does not contain all Gold Book Criteria and Idaho W.Q. Standards [Enter non-listed pollutants manually]	Aquatic Life Acute (ug/L)	Aquatic Life Chronic (ug/L)	Human Health (ug/L)	Aquatic Life Acute (ug/L)	Aquatic Life Chronic (ug/L)	Human Health (ug/L)	LTA Acute (ug/L)	LTA Chronic (ug/L)	LTA Min. (ug/L)
METALS									
Arsenic (c)	14.13	14.13	5.88 !	747.46	394.20	0.57	240.00	207.92	207.92
Cadmium (H)	9.97 !	9.97 !	4.17	2.51	0.70	51.22	0.80	0.37	0.37
Copper (H)	30.96 !	30.96 !	13.63 NA	13.21	8.77	NA	4.24	4.63	4.24
Lead (H)	86.80 !	86.80 !	35.54	51.73	2.60	254.39	16.61	1.37	1.37
Mercury	2.17	2.17 !	0.98 !	4.75	0.22	0.22	1.53	0.12	0.12
Zinc (H)	95.39 !	95.39 !	42.86 NA	104.43	93.66	NA	33.53	49.40	33.53
				0.00	0.00	0.00			
				0.00	0.00	0.00			
				0.00					

! = Permit limit recommended
NA = No Available Std or Criterion
MDL = Maximum Daily Limit
AML = Average Monthly Limit
Caution** This spreadsheet set WLA to from TUa using the ACR
TUc = Chronic Toxic Units
TUa = Acute Toxic Units
pH = pH dependent
H = Hardness dependent
c = Carcinogen
* = For use in interpreting

POLLUTANTS	PERMIT LIMITS						
{Commonly Encountered Pollutants} This list does not contain all Gold Book Criteria and Idaho W.Q. Standards [Enter non-listed pollutants manually]	Permit Sample Frequency (n/month)	Aquatic Life MDL (ug/L)	Aquatic Life AML (ug/L)	Human Health MDL (ug/L)	Human Health AML (ug/L)	Most Stringent MDL (ug/L)	Most Stringent AML (ug/L)
METALS							
Arsenic (c)	1.00	647.54	443.88	0.83	0.57	0.83	0.57
Cadmium (H)	1.00	1.14	0.78	74.72	51.22	1.14	0.78
Copper (H)	1.00	13.21	9.05	NA	NA	13.21	9.05
Lead (H)	1.00	4.27	2.93	371.10	254.39	4.27	2.93
Mercury	1.00	0.36	0.25	0.32	0.22	0.32	0.22
Zinc (H)	1.00	104.43	71.59	NA	NA	104.43	71.59
	!!! HIT ALT-P TO PRINT !!!						

! = Permit limit recommended
NA = No Available Std or Criterion
MDL = Maximum Daily Limit
AML = Average Monthly Limit
Caution** This spreadsheet set WLA to from TUa using the ACR
TUc = Chronic Toxic Units
TUa = Acute Toxic Units
pH = pH dependent
H = Hardness dependent
c = Carcinogen
* = For use in interpreting

Attachment 2 (< 97 cfs)

IDAHO FRESHWATER WATER QUALITY-BASED PERMIT LIMITS SPREADSHEET - REGION X DRAFT

Please Provide The Following Required Information: 06/28/94

1) NPDES Permit Number: ID-0020540-3

2) Facility Name: Cyprus Thompson Creek Molybdenum Mine, Clayton, Idaho

3) Outfall Number (include a ' prior to number): Outfall 004

4) Maximum Effluent Flow
4a) Will The Units Be In MGD or CFS ([M] or [C])? C
4b) Enter the Flow: 3.15

5) Receiving Water Parameters (Freshwater)

5a) pH: 7.6
5b) Temperature (oC): 4.8
5c) Hardness (mg/L CaCO3): 48

6) [D]ilution (w/mixing zone) or [R]iver Flow? R

Enter Percent of Flow for Mixing Zone

6a) Units In MGD or CFS ([M] or [C])? C<- Enter Here
6b) Will Mixing Zone Be Allowed ([Y] or [N])? Y<- Enter Here
6c) Aquatic Life Acute (1Q10): 4.05 6g) % Available: 25
6d) Aquatic Life Chronic (7Q10): 4.6 6h) % Available: 25
6e) Human Health - Carcinogens (Harmonic Mean): 13.07 6i) % Available: 100
6f) Human Health - Non-Carcinogens (30Q5): 5.98 6j) % Available: 100

7) Desired Percentile Occurrence Probability for WLA and MDL Multipliers
(Enter "95" or "99" in Each Cell Below):

7a) Aquatic Life Acute WLA Multiplier Percentile: 99
7b) Aquatic Life Chronic WLA Multiplier Percentile: 99
7c) Aquatic Life Multiplier/Max Daily (MDL): 99
7d) Aquatic Life Multiplier/Avg Monthly (AML): 95
7e) Human Health Multiplier/Max Daily (MDL): 99
7f) Human Health Multiplier/Avg Monthly (AML): 95

8) Acute to Chronic Ratio (default = 10)
for Whole Effluent Toxicity: 10

9) HIT ALT-A OR ALT-B TO CONTINUE DATA ENTRY
HIT ALT-R TO RETURN TO THIS SCREEN
HIT ALT-P TO PRINT SPREADSHEET
HIT ALT-H FOR HELP SCREEN

POLLUTANTS	MOST STRINGENT OF THE CRITERIA & STANDARDS			EFFLUENT AND RECEIVING WATER CHARACTERISTICS (USER INPUT)				
{Commonly Encountered Pollutants} This list does not contain all Gold Book Criteria and Idaho W.Q. Standards [Enter non-listed pollutants manually]	Aquatic Life Acute (ug/L)	Aquatic Life Chronic (ug/L)	Human Health (ug/L)	Effluent Max. Conc. (ug/L)	Number of Effluent Samples Collected (n)	Coeff. of Variation (CV)	Reasonable Potential Multiplier	Receiving Water Upstream Conc. (ug/L)
METALS								
Arsenic (c)	360.00	190.00	0.14	11.50	37.00	0.60	2.30	0.00
Cadmium (H)	1.71	0.64	10.00	14.50	37.00	0.60	2.30	7.00
Copper (H)	8.88	6.32	NA	155.00	36.00	0.60	2.30	5.00
Lead (H)	32.07	1.27	50.00	1.60	37.00	0.60	2.30	0.00
Mercury	2.40	0.01	0.15	35.00	37.00	0.60	2.30	0.00
Zinc (H)	62.83	56.91	NA	64.50	38.00	0.60	2.30	3.80
				!!! HIT ALT-B TO CONTINUE DATA ENTRY !!!				

! = Permit limit recommended
NA = No Available Std or Criterion
MDL = Maximum Daily Limit
AML = Average Monthly Limit
Caution** This spreadsheet set WLA to Background from TUa using the ACR
TUc = Chronic Toxic Units
TUa = Acute Toxic Units
pH = pH dependent
H = Hardness dependent
c = Carcinogen
* = For use in interpreting

POLLUTANTS	MAXIMUM PROJECTED RECEIVING WATER CONCENTRATION (based on reasonable potential multiplier)			WASTELOAD ALLOCATION			CALCULATION OF LONG-TERM AVERAGE FOR AQUATIC LIFE		
{Commonly Encountered Pollutants} This list does not contain all Gold Book Criteria and Idaho W.Q. Standards [Enter non-listed pollutants manually]	Aquatic Life Acute (ug/L)	Aquatic Life Chronic (ug/L)	Human Health (ug/L)	Aquatic Life Acute (ug/L)	Aquatic Life Chronic (ug/L)	Human Health (ug/L)	LTA Acute (ug/L)	LTA Chronic (ug/L)	LTA Min. (ug/L)
METALS									
Arsenic (c)	20.02	19.38	5.14 !	475.71	259.37	0.72	152.74	136.80	136.80
Cadmium (H)	26.94 !	26.30 !	16.09 !	7.00	7.00	22.45	2.25	3.69	2.25
Copper (H)	271.00 !	262.49 !	126.27 NA	10.12	6.80	NA	3.25	3.58	3.25
Lead (H)	2.78	2.70 !	1.27	42.38	1.74	257.46	13.61	0.92	0.92
Mercury	60.92 !	58.97 !	27.77 !	3.17	0.02	0.77	1.02	0.01	0.01
Zinc (H)	113.19 !	109.69 !	53.67 NA	81.81	76.30	NA	26.27	40.24	26.27
				0.00	0.00	0.00			
				0.00	0.00	0.00			
				0.00					

! = Permit limit recommended
NA = No Available Std or Criterion
MDL = Maximum Daily Limit
AML = Average Monthly Limit
Caution** This spreadsheet set WLA to from TUa using the ACR
TUc = Chronic Toxic Units
TUa = Acute Toxic Units
pH = pH dependent
H = Hardness dependent
c = Carcinogen
* = For use in interpreting

POLLUTANTS	PERMIT LIMITS						
{Commonly Encountered Pollutants} This list does not contain all Gold Book Criteria and Idaho W.Q. Standards [Enter non-listed pollutants manually]	Permit Sample Frequency (n/month)	Aquatic Life MDL (ug/L)	Aquatic Life AML (ug/L)	Human Health MDL (ug/L)	Human Health AML (ug/L)	Most Stringent MDL (ug/L)	Most Stringent AML (ug/L)
METALS							
Arsenic (c)	1.00	426.05	292.05	1.05	0.72	1.05	0.72
Cadmium (H)	1.00	7.00	4.80	32.75	22.45	7.00	4.80
Copper (H)	1.00	10.12	6.94	NA	NA	10.12	6.94
Lead (H)	1.00	2.85	1.95	375.59	257.46	2.85	1.95
Mercury	1.00	0.03	0.02	1.13	0.77	0.03	0.02
Zinc (H)	1.00	81.81	56.08	NA	NA	81.81	56.08
	!!! HIT ALT-P TO PRINT !!!						

! = Permit limit recommended
NA = No Available Std or Criterion
MDL = Maximum Daily Limit
AML = Average Monthly Limit
Caution** This spreadsheet set WLA to from TUa using the ACR
TUc = Chronic Toxic Units
TUa = Acute Toxic Units
pH = pH dependent
H = Hardness dependent
c = Carcinogen
* = For use in interpreting

Attachment 2 (≥ 97cfs)

IDAHO FRESHWATER WATER QUALITY-BASED PERMIT LIMITS SPREADSHEET - REGION X DRAFT

06/15/94

Please Provide The Following Required Information:

1)	NPDES Permit Number:	ID-0020540-3
2)	Facility Name:	Cyprus Thompson Creek Molybdenum Mine, Clayton, Idaho
3)	Outfall Number (include a ' prior to number):	Outfall 004
4)	Maximum Effluent Flow	
4a)	Will The Units Be In MGD or CFS ([M] or [C])?	C
4b)	Enter the Flow:	3.15
5)	Receiving Water Parameters (Freshwater)	
5a)	pH:	7.6
5b)	Temperature (oC):	4.8
5c)	Hardness (mg/L CaCO3):	48

6) [D]ilution (w/mixing zone) or [R]iver Flow? R

Enter Percent of Flow for Mixing Zone

6a)	Units In MGD or CFS ([M] or [C])?	C<- Enter Here		
6b)	Will Mixing Zone Be Allowed ([Y] or [N])?	Y<- Enter Here		
6c)	Aquatic Life Acute (1Q10):	97	6g) % Available:	25
6d)	Aquatic Life Chronic (7Q10):	97	6h) % Available:	25
6e)	Human Health - Carcinogens (Harmonic Mean):	97	6i) % Available:	100
6f)	Human Health - Non-Carcinogens (30Q5):	97	6j) % Available:	100

7) Desired Percentile Occurrence Probability for WLA and MDL Multipliers (Enter "95" or "99" in Each Cell Below):

7a)	Aquatic Life Acute WLA Multiplier Percentile:	99
7b)	Aquatic Life Chronic WLA Multiplier Percentile:	99
7c)	Aquatic Life Multiplier/Max Daily (MDL):	99
7d)	Aquatic Life Multiplier/Avg Monthly (AML):	95
7e)	Human Health Multiplier/Max Daily (MDL):	99
7f)	Human Health Multiplier/Avg Monthly (AML):	95

8) Acute to Chronic Ratio (default = 10) for Whole Effluent Toxicity: 10

9) HIT ALT-A OR ALT-B TO CONTINUE DATA ENTRY
HIT ALT-R TO RETURN TO THIS SCREEN
HIT ALT-P TO PRINT SPREADSHEET
HIT ALT-H FOR HELP SCREEN

POLLUTANTS {Commonly Encountered Pollutants} This list does not contain all Gold Book Criteria and Idaho W.Q. Standards [Enter non-listed pollutants manually]	MOST STRINGENT OF THE CRITERIA & STANDARDS Aquatic Life Acute (ug/L)	 Aquatic Life Chronic (ug/L)	 Human Health (ug/L)	EFFLUENT AND RECEIVING WATER CHARACTERISTICS (USER INPUT) Effluent Max. Conc. (ug/L)	 Number of Effluent Samples Collected (n)	 Coeff. of Variation (CV)	 Reasonable Potential Multiplier	 Receiving Water Upstream Conc. (ug/L)
METALS								
Arsenic (c)	360.00	190.00	0.14	11.50	37.00	0.60	2.30	0.00
Cadmium (H)	1.71	0.64	10.00	14.50	37.00	0.60	2.30	7.00
Copper (H)	8.88	6.32	NA	155.00	36.00	0.60	2.30	5.00
Lead (H)	32.07	1.27	50.00	1.60	37.00	0.60	2.30	0.00
Mercury	2.40	0.01	0.15	35.00	37.00	0.60	2.30	0.00
Zinc (H)	62.83	56.91	NA	64.50	38.00	0.60	2.30	3.80
				!!! HIT ALT-B TO CONTINUE DATA ENTRY !!!				

! = Permit limit recommended
NA = No Available Std or Criterion
MDL = Maximum Daily Limit
AML = Average Monthly Limit
Caution** This spreadsheet set WLA to Background from TUa using the ACR
TUc = Chronic Toxic Units
TUa = Acute Toxic Units
pH = pH dependent
H = Hardness dependent
c = Carcinogen
* = For use in interpreting

POLLUTANTS	MAXIMUM PROJECTED RECEIVING WATER CONCENTRATION (based on reasonable potential multiplier)			WASTELOAD ALLOCATION			CALCULATION OF LONG-TERM AVERAGE FOR AQUATIC LIFE		
{Commonly Encountered Pollutants} This list does not contain all Gold Book Criteria and Idaho W.Q. Standards [Enter non-listed pollutants manually]	Aquatic Life Acute (ug/L)	Aquatic Life Chronic (ug/L)	Human Health (ug/L)	Aquatic Life Acute (ug/L)	Aquatic Life Chronic (ug/L)	Human Health (ug/L)	LTA Acute (ug/L)	LTA Chronic (ug/L)	LTA Min. (ug/L)
METALS									
Arsenic (c)	3.04	3.04	0.83 !	3131.43	1652.70	4.45	1005.45	871.69	871.69
Cadmium (H)	10.03 !	10.03 !	7.83	7.00	7.00	102.38	2.25	3.69	2.25
Copper (H)	45.41 !	45.41 !	16.06 NA	38.72	16.44	NA	12.43	8.67	8.67
Lead (H)	0.42	0.42	0.12	278.99	11.06	1589.68	89.58	5.83	5.83
Mercury	9.25 !	9.25 !	2.53 !	20.88	0.10	4.77	6.70	0.06	0.06
Zinc (H)	20.42	20.42	8.35 NA	517.29	465.77	NA	166.09	245.66	166.09
				0.00	0.00	0.00			
				0.00	0.00	0.00			
				0.00					

! = Permit limit recommended
NA = No Available Std or Criterion
MDL = Maximum Daily Limit
AML = Average Monthly Limit
Caution** This spreadsheet set WLA to from TUa using the ACR
TUc = Chronic Toxic Units
TUa = Acute Toxic Units
pH = pH dependent
H = Hardness dependent
c = Carcinogen
* = For use in interpreting

POLLUTANTS	PERMIT LIMITS						
{Commonly Encountered Pollutants} This list does not contain all Gold Book Criteria and Idaho W.Q. Standards [Enter non-listed pollutants manually]	Permit Sample Frequency (n/month)	Aquatic Life MDL (ug/L)	Aquatic Life AML (ug/L)	Human Health MDL (ug/L)	Human Health AML (ug/L)	Most Stringent MDL (ug/L)	Most Stringent AML (ug/L)
METALS							
Arsenic (c)	1.00	2714.84	1860.99	6.49	4.45	6.49	4.45
Cadmium (H)	1.00	7.00	4.80	149.35	102.38	7.00	4.80
Copper (H)	1.00	27.00	18.51	NA	NA	27.00	18.51
Lead (H)	1.00	18.16	12.45	2319.05	1589.68	18.16	12.45
Mercury	1.00	0.17	0.12	6.96	4.77	0.17	0.12
Zinc (H)	1.00	517.29	354.59	NA	NA	517.29	354.59
	!!! HIT ALT-P TO PRINT !!!						

! = Permit limit recommended
NA = No Available Std or Criterion
MDL = Maximum Daily Limit
AML = Average Monthly Limit
Caution** This spreadsheet set WLA to from TUa using the ACR
TUc = Chronic Toxic Units
TUa = Acute Toxic Units
pH = pH dependent
H = Hardness dependent
c = Carcinogen
* = For use in interpreting

Attachment 3

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IDAHO FRESHWATER WATER QUALITY-BASED PERMIT LIMITS SPREADSHEET - REGION X                    DRAFT
-----------------------------------------------------------------------------------------------------
Please Provide The Following Required Information:                                       06/20/94
-----------------------------------------------------------------------------------------------------
1)                           NPDES Permit Number:   ID-0020540-3

2)                                 Facility Name:  Cyprus Thompson Creek Molybdenum Mine, Clayton, Idaho

3)     Outfall Number (include a ' prior to number):   Outfall 005

4)                         Maximum Effluent Flow
  4a)  Will The Units Be In MGD or CFS ([M] or [C])?             C
  4b)                            Enter the Flow:              4.15


5)          Receiving Water Parameters (Freshwater)

  5a)                                        pH:               7.5
  5b)                          Temperature (oC):               4.8
  5c)                     Hardness (mg/L CaCO3):                28


6) [D]ilution (w/mixing zone) or [R]iver Flow?                   R
                                                                         Enter Percent of Flow for Mixing Zone
  6a)         Units In MGD or CFS ([M] or [C])?     C<- Enter Here       |
  6b)  Will Mixing Zone Be Allowed ([Y] or [N])?    Y<- Enter Here       V
  6c)                Aquatic Life Acute   (1Q10):           241.06   6g) % Available:  25
  6d)                Aquatic Life Chronic (7Q10):           263.78   6h) % Available:  25
  6e) Human Health - Carcinogens (Harmonic Mean):            559.1   6i) % Available: 100
  6f)    Human Health - Non-Carcinogens (30Q5):              293.1   6j) % Available: 100

7)  Desired Percentile Occurrence Probability for WLA and MDL Multipliers
    (Enter "95" or "99" in Each Cell Below):

  7a)   Aquatic Life Acute WLA Multiplier Percentile:           99
  7b)  Aquatic Life Chronic WLA Multiplier Percentile:          99
  7c)       Aquatic Life Multiplier/Max Daily (MDL):            99
  7d)     Aquatic Life Multiplier/Avg Monthly (AML):            95
  7e)       Human Health Multiplier/Max Daily (MDL):            99
  7f)     Human Health Multiplier/Avg Monthly (AML):            95

8)            Acute to Chronic Ratio (default = 10)
                     for Whole Effluent Toxicity:               10

9)  HIT ALT-A OR ALT-B TO CONTINUE DATA ENTRY
    HIT ALT-R TO RETURN TO THIS SCREEN
    HIT ALT-P TO PRINT SPREADSHEET
    HIT ALT-H FOR HELP SCREEN
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POLLUTANTS	MOST STRINGENT OF THE CRITERIA & STANDARDS			EFFLUENT AND RECEIVING WATER CHARACTERISTICS (USER INPUT)				
{Commonly Encountered Pollutants} This list does not contain all Gold Book Criteria and Idaho W.Q. Standards [Enter non-listed pollutants manually]	Aquatic Life Acute (ug/L)	Aquatic Life Chronic (ug/L)	Human Health (ug/L)	Effluent Max. Conc. (ug/L)	Number of Effluent Samples Collected (n)	Coeff. of Variation (CV)	Reasonable Potential Multiplier	Receiving Water Upstream Conc. (ug/L)
METALS								
Arsenic (c)	360.000	190.000	0.018	38.50	74.00	0.60	2.30	0.75
Cadmium (H)	0.933	0.417	10.000	15.40	74.00	0.60	2.30	0.00
Copper (H)	5.342	3.984	NA	28.30	73.00	0.60	2.30	0.00
Lead (H)	16.150	0.642	50.000	122.60	73.00	0.60	2.30	0.00
Mercury	2.400	0.012	0.150	1.49	74.00	0.60	2.30	0.70
Zinc (H)	39.796	36.045	NA	105.60	75.00	0.60	2.30	13.00

!!! HIT ALT-B TO CONTINUE DATA ENTRY !!!

! = Permit limit recommended
NA = No Available Std or Criterion
MDL = Maximum Daily Limit
AML = Average Monthly Limit
Caution** WLA set to background when criteria exceeded upstream
TUc = Chronic Toxic Units
TUa = Acute Toxic Units
pH = pH dependent
H = Hardness dependent
c = Carcinogen
* = For use in interpreting

POLLUTANTS	MAXIMUM PROJECTED RECEIVING WATER CONCENTRATION (based on reasonable potential multiplier)			WASTELOAD ALLOCATION			CALCULATION OF LONG-TERM AVERAGE FOR AQUATIC LIFE		
{Commonly Encountered Pollutants} This list does not contain all Gold Book Criteria and Idaho W.Q. Standards [Enter non-listed pollutants manually]	Aquatic Life Acute (ug/L)	Aquatic Life Chronic (ug/L)	Human Health (ug/L)	Aquatic Life Acute (ug/L)	Aquatic Life Chronic (ug/L)	Human Health (ug/L)	LTA Acute (ug/L)	LTA Chronic (ug/L)	LTA Min. (ug/L)
METALS									
Arsenic (c)	6.41	5.95	1.40 !	5576.92	3197.25	0.75	1790.65	1686.34	1686.34
Cadmium (H)	2.28 !	2.10 !	0.49	14.48	7.05	1357.23	4.65	3.72	3.72
Copper (H)	4.19	3.85	0.91 NA	82.92	67.30	NA	26.62	35.49	26.62
Lead (H)	18.17 !	16.69 !	3.94	250.67	10.85	6786.14	80.49	5.72	5.72
Mercury	0.88	0.86 !	0.74 !	27.09	0.70	0.70	8.70	0.37	0.37
Zinc (H)	27.81	26.61	16.21 NA	428.93	402.24	NA	137.72	212.16	137.72
				0.00	0.00	0.00			
				0.00	0.00	0.00			
				0.00					

! = Permit limit recommended
NA = No Available Std or Criterion
MDL = Maximum Daily Limit
AML = Average Monthly Limit
Caution** WLA set to background when criteria exceeded upstream
TUc = Chronic Toxic Units
TUa = Acute Toxic Units
pH = pH dependent
H = Hardness dependent
c = Carcinogen
* = For use in interpreting

POLLUTANTS	PERMIT LIMITS						
{Commonly Encountered Pollutants} This list does not contain all Gold Book Criteria and Idaho W.Q. Standards [Enter non-listed pollutants manually]	Permit Sample Frequency (n/month)	Aquatic Life MDL (ug/L)	Aquatic Life AML (ug/L)	Human Health MDL (ug/L)	Human Health AML (ug/L)	Most Stringent MDL (ug/L)	Most Stringent AML (ug/L)
METALS							
Arsenic (c)	4.00	5252.02	2617.91	1.50	0.75	1.50	0.75
Cadmium (H)	4.00	11.58	5.77	2722.86	1357.23	11.58	5.77
Copper (H)	4.00	82.92	41.33	NA	NA	82.92	41.33
Lead (H)	4.00	17.83	8.89	13614.29	6786.14	17.83	8.89
Mercury	4.00	1.15	0.57	1.40	0.70	1.15	0.57
Zinc (H)	4.00	428.93	213.80	NA	NA	428.93	213.80
	!!! HIT ALT-P TO PRINT !!!						

! = Permit limit recommended
NA = No Available Std or Criterion
MDL = Maximum Daily Limit
AML = Average Monthly Limit
Caution** WLA set to background
when criteria exceeded upstream
TUc = Chronic Toxic Units
TUa = Acute Toxic Units
pH = pH dependent
H = Hardness dependent
c = Carcinogen
* = For use in interpreting

CYPRUS THOMPSON CREEK

WATER QUALITY MONITORING PROGRAM

1987

Temporary Attachment
#4

-New plan (1994)
will be attached to
the P.N. package.

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APPENDICES

A) Field and Lab Data Forms

B) Recommendations for Sample Preservation

C) Laboratory Methods

CYPRUS THOMPSON CREEK WATER MONITORING PROGRAM 1987

1.0 INTRODUCTION

This document describes the Standard Operating Procedures for the collection and analysis of surface and ground water samples from the Cyprus Thompson Creek Mine. The data obtained during the years 1982-86 have been reviewed to produce this plan.

1.1 OBJECTIVES

The water quality monitoring program has been designed to obtain samples and analytical results that give true indications of the quality of mine area waters. The information obtained from the monitoring program will be used to assess the effectiveness of mitigation measures. The major areas covered by this water quality monitoring plan are as follows:

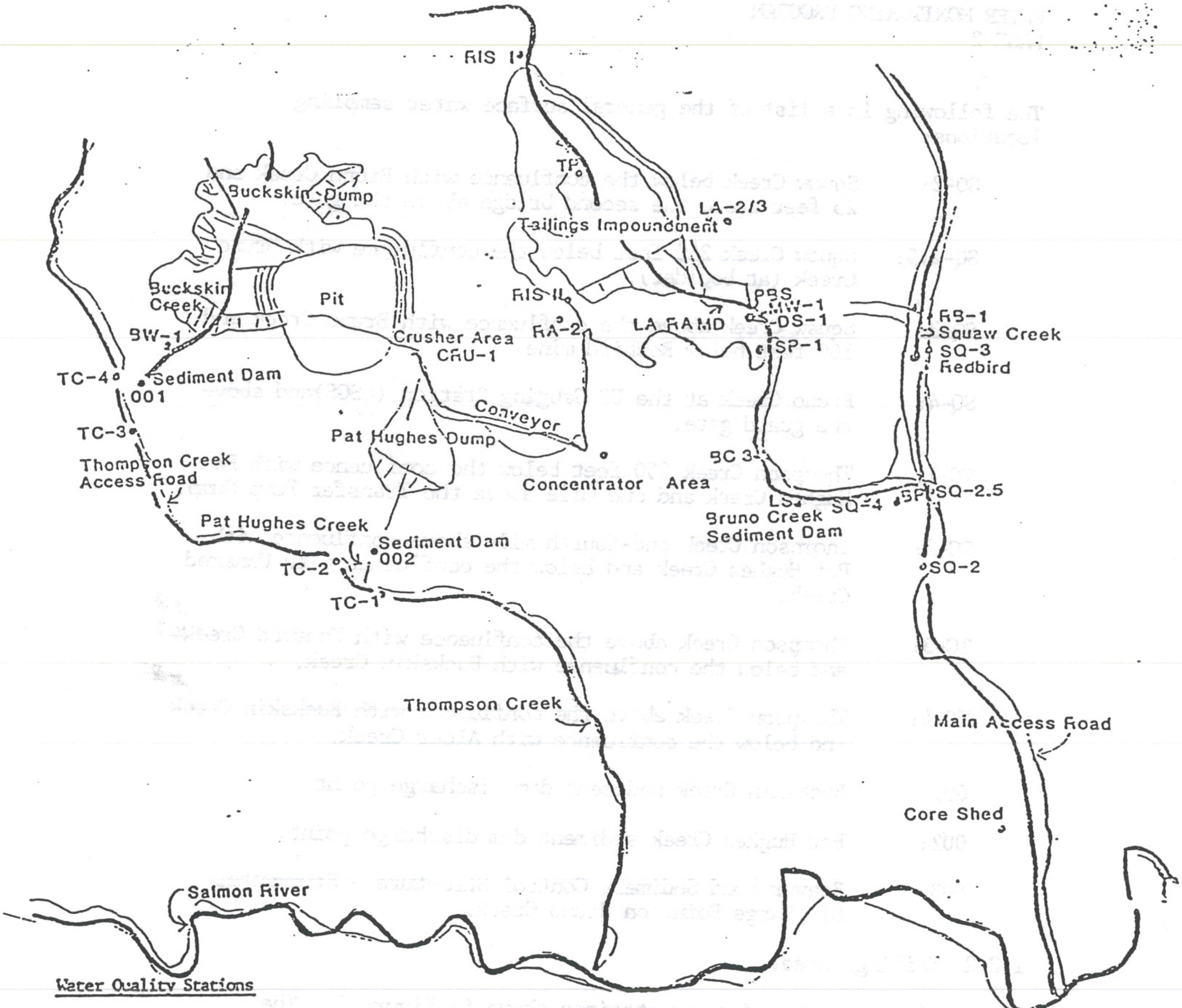
- Surface water quality of the Squaw and Thompson Creek drainages.
- Quantity and quality of effluents released from settling ponds on Pat Hughes and Buckskin creeks.
- Surface and ground water quality in the tailings impoundment drainage basin.
- Quality of ground water developed as potable sources for workers at the mine site.
- Fish and invertebrate populations of streams draining the active mine and mill operation areas.

1.2 SITE DESCRIPTIONS

1.2.1 Surface Water Stations:

Surface water sites on Squaw and Thompson Creeks were chosen prior to construction for monitoring primary and secondary impacts of mining activities.

Cyprus Thompson Creek



Water Quality Stations

001	Buckskin Sediment Dam	BC-3	Bruno Creek Well at Pope John Boulevard
TC-4	Above Buckskin Creek	RA-2	Right Abutment/Tailings Well
TC-3	Below Buckskin Creek	LA-2/3	Left Abutment/Tailings Wells
BW-1	Artesian Well above Buckskin Dam	LA	Left Abutment of Rock Toe
002	Pat Hughes Sediment Dam	SRD	Seepage Return Dam Pond
TC-2	Above Pat Hughes Creek	MD	Rock Toe - Main Drain from Paddocks into SRD Pond. Center, lower weir.
TC-1	Below Pat Hughes Creek	RA	Right Abutment of Rock Toe
SQ-2	Below Guard Gate on Squaw Creek at USGS Station	PBS	Pump Back Station (below SRD)
SQ-2.5	250 ft. below confluence of Squaw and Bruno Creek	MW-1	Monitoring Well (below Pump Back)
SQ-3	Below Redbird Mine at Squaw Creek	DS-1	Down Stream Spring (below Pump Back)
RB-1	Creek above Redbird Mine/drains from west into Squaw Creek	SP-1	Sediment Pond (1/4 mile below Pump Back)
SQ-4	Above Guard Gate at USGS Station	RIS I	Upper Bruno Creek
LS	Limestone Spring Sediment Dam (above SQ-4)	TP	Tailings Pond Water (barge)
BP-1	Beaver Pond (below Limestone Spring at Bruno Creek Mouth)	RIS II	Right abutment above drop boxes
003	Beaver Pond Stormwater D.P.	DD	Diversion Ditch left of tailings

The following is a list of the general surface water sampling locations:

- SQ-2: Squaw Creek below the confluence with Bruno Creek and 25 feet above the second bridge above the gate.
- SQ-2.5: Squaw Creek 250 feet below the confluence with Bruno Creek (at boulder).
- SQ-3: Squaw Creek above the confluence with Bruno Creek and 100 feet below Redbird mine.
- SQ-4: Bruno Creek at the US Gauging Station (USGS)and above the guard gate.
- TC-1: Thompson Creek 250 feet below the confluence with Pat Hughes Creek and one mile above the Transfer Pump Sump.
- TC-2: Thompson Creek one-fourth mile above confluence with Pat Hughes Creek and below the confluence with Unnamed Creek.
- TC-3: Thompson Creek above the confluence with Unnamed Creek and below the confluence with Buckskin Creek.
- TC-4: Thompson Creek above the confluence with Buckskin Creek and below the confluence with Alder Creek.
- 001: Buckskin Creek sediment dam discharge point.
- 002: Pat Hughes Creek sediment dam discharge point.
- 003: Beaver Pond Sediment Control Structure - Stormwater Discharge Point on Bruno Creek.

1.2.2 Tailings Area:

Surface and ground water stations shown in Figure 2. The following is a brief description of these stations:

Surface Water Stations:

- TP: Tailings pond (barge).
- RIS I: (Upper) Head of Bruno Creek at juncture of the RIS road and one-fourth mile from the north end of the Diversion Ditch.
- RIS II: (Intermediate) Parallel with and above drop boxes at right abutment of the header line and on the RIS road.

RIS: (Lower) At pumpback on the right abutment.

LA: Left Abutment of the Rock Toe.

MD: Main Drain (lower, center) of the Rock Toe.

RA: Right Abutment of the Rock Toe.

DD: Diversion Ditch on left abutment above tailings line at the end of the ditch before it drops into the pipeline going to pumpback.

PBS: Pump-back system, inlet to sump on lower tailings road south of the Seepage Return Dam.

DS-1: First down stream spring 100 feet below pumpback system and 25 feet below the monitoring well on Bruno Creek (east bank).

SP-1: Sediment pond at elevation 6640 ft. on Bruno Creek, one half mile below pumpback system.

RB-1: Redbird Creek tributary to Squaw Creek one mile above Redbird Mine..

Ground Water Stations:

MW-1: Monitoring well located approximately 100 feet below the Seepage Return Dam.

BC-3: Former production well on lower Bruno Creek at Pope John Boulevard.

LA-2: Monitoring well located on the left abutment above the center line of the tailings impoundment.

LA-3: Monitoring well located on the left abutment (east upper ridge) of the tailings impoundment.

RA-2: Monitoring well located on the right abutment (west edge) of the tailings impoundment and one half mile off of the old upper mine (motivator) road.

Deleted Stations:

SQ-1: Mouth of Squaw Creek, below former construction camp.

RT: Main drain below rock toe. (Name changed to MD - new weir constructed in 1986, approximately 100 feet below old site.)

SS-4: SRD spring #4 located between the SRD and the pumpback system.

SD: SRD main drain located just below the seepage return dam.

1.2.3 Potable Water Wells and Sampling Locations:

Locations of potable water wells are shown in Figure 3. They are as follows:

CON-1: Concentrator Well #1 which supplies the administration building, the analytical lab and the concentrator.

CRU-1: Crusher Well #1 which supplies all facilities at the crusher site.

Samples will be collected from each of the distribution systems served by these wells.

1.2.4. Other Wells

BW-1: Artesian Well 200 feet below Buckskin Dump.

2.0 WATER QUALITY MONITORING PROGRAM 1986 - Summary of Changes

Intensive water quality monitoring of 3 streams located on the Cyprus Thompson Creek claim area has been on going since 1980. Five and a half years of data (2½ yrs. post construction) have been collected for Bruno, Squaw, and Thompson Creek. Two and a half years of data have been collected for 10 stations in the tailing area. With three and a half years of monitoring during production, parameter trends influenced by tailing deposition have been characterized.

The plan objective is to monitor for downstream detection of significant process water influence and to prevent unnecessary contamination of Squaw and Thompson Creeks. The best indicators of process water influence is a sharp or significant increase in conductivity and chloride and to a slower degree, sulfate and molybdenum. Therefore, parameters such as calcium, magnesium, potassium, sodium, fluoride, bromide and sulfide, hardness, and TDS which have already been characterized for each stream have been reduced to an annual scan of all parameters at SQ-2. They would be reinstated if and when the indicator parameters showed evidence of contamination. Process water monitoring will be conducted at one location, the pumpback system, and will continue on an annual basis for all parameters at Station TP. All downstream stations, with one exception will be retained for monitoring. The exception, SQ-1 at the mouth of Squaw Creek was originally sampled primarily to monitor effects of Cyprus' sewage waste water treatment facility which is no longer in service.

In general, a less intensive sampling frequency, along with a reduction in number of stations and parameters will be conducted. The nature of the program will be shifted from a water chemistry characterization program to an impact surveillance program.

2.1 SUMMARY TABLE OF 1987 MONITORING PROGRAM
(Numbers refer to accompanying tables indicating parameters to be analyzed).

STATION	WEEKLY	MONTHLY	QUARTERLY	ANNUAL
TP		1		1,2,3,4
MD	1	1	1	1
PBS		1	2	3
DD	5f			
LA	5f			
RA	5f			
MW-1		1	2	3
DS-1		1	2	3
SP-1		1	2	3
BC-3		1	2	3
LS	5d,f			
BP	5d,f			
SQ-4		1	2	3,6
SQ-3		1	2,8	3,6,9,10
SQ-2.5	5d			
SQ-2		1	2,8	3,4,6,9,10
RB-1			1	2,3
RA-2			1	2,3
LA-2			1	2,3
LA-3		11	11	
RIS I		1		
RIS II	5f			
RIS L	5f			
TC-1		5c*	8	1,2,3,4,6,9,10
TC-2		5c*		1,2,3,6
TC-3		5c*		1,2,3,6
TC-4		5c*	8	1,2,3,6,9,10
BW-1				1,2,3
001	5a		5b	
002	5a		5b	
BP-003-	5d			
CON-1		7a		7b
CRU-1		7a		7b

* Except when NPDES discharge point is not flowing

2.2 MONTHLY SCHEDULE OF MONITORING PROGRAM 1987

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
RIS I (clock)	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f
TP											1,2,3,4	
RIS II		5f	5f	5f	5f	5f	5f					
MD	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e
LA	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e
RA	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e
PBS	1	1,2	1	1	1,2	1	1	1,2	1	1	1,2,3*	1
MW-1	1	1,2*	1	1	1,2	1	1	1,2	1	1	1,2,3	1
RIS L		5f	5f	5f	5f	5f	5f					
DS-1	1	1,2	1	1	1,2	1	1	1,2	1	1	1,2,3	1
SP-1	1	1,2	1	1	1,2	1	1	1,2	1	1	1,2,3	1
RA-2**	11	11	11	11	1			1		1		
LA-2**	11	11	11	11	11			11		11		
LA-3**	11	11	11	11	11			11		11		
DD		5f	5f	5f	5f	5f	5f					
BC-3	1	1,2	1	1	1,2	1	1	1,2	1	1	1,2,3	1
LS		5c	5c	5c	5c	5c	5c					
SQ-4	1	1,2	1	1	1,2	1	1	1,2,6	1	1	1,2,3	1
BP												
SQ-3	1	1,2	1	1	1,2	1,10	1,8	1,2,6	1,9	1,8	1,2,3*	1
RB-1		1			1			1			1	
SQ-2.5		5d	5d	5d	5d	5d	5d					
SQ-2	1	1,2*	1	1	1,2	1,10	1,8	1,2,6	1,9	1,8	1,2,3,4	1
TC-1	5c	5c	5c	5c	5c	5c,10	5c,8	5c,6	9,5c	1,2,3* 4,8	5c	5c
TC-2	5c	5c	5c	5c	5c	5c	5c	5c,6		1,2,3	5c	5c
TC-3	5c	5c	5c	5c	5c	5c	5c	5c,6		1,2,3	5c	5c
TC-4	5c	5c	5c	5c	5c	5c,10	5c,8	5c,6	9	1,2,3,8*	5c	5c
BW-1										1,2,3		
001(clock)	5a	5a,b*	5a	5a	5a,b	5a	5a	5a,b	5a	5a	5a,b	5a
002(clock)	5a	5a,b	5a	5a	5a,b	5a	5a	5a,b	5a	5a	5a,b*	5a
003(clock) (BP)	5c	5c	5c	5c	5c	5c	5c	5c	5c	5c	5c	5c
CON-1	7a,b	7a	7a	7a	7a	7a	7a	7a	7a	7a	7a	7a
CRU-1	7a,b	7a	7a	7a	7a	7a	7a	7a	7a	7a	7a	7a

* Quality Control Samples, See section 5.0.
** Except under hazardous conditions.

2.3 PARAMETER GROUPS 1-10

GROUP 1
FIELD PARAMETERS

Conductivity
pH
Temperature
Turbidity

GROUP 2
IMPORTANT INDICATORS

Suspended Solids
Alkalinity
Chloride
Sulfate
Xanthates
Iron
Manganese
Molybdenum

GROUP 3
METALS

Copper
Lead
Mercury
Zinc
Selenium

GROUP 4
REMAINING PARAMETERS FOR TOTAL SURVEY

Total Dissolved Solids
Hardness
Calcium
Fluoride
Magnesium
Potassium
Silica
Sodium
Sulfide
Phosphate
Nitrate
Aluminum
Arsenic
Barium
Cadmium
Chromium
Cobalt
Nickel
Silver
COD
Cyanide

GROUP 5
SPECIAL PARAMETERS FOR COMPLIANCE

5a - Weekly (NPDES)
Suspended Solids
pH
Continuous Flow

5b - Quarterly (NPDES)
Cadmium
Copper
Zinc
Arsenic

5c - Monthly (NPDES)
Turbidity

5d - Weekly
Turbidity
During runoff
Feb. - June

5e - Monthly
pH and Flow

5f - Weekly
Staff Gauge
During runoff
Feb. - June

GROUP 6
STREAMBED SEDIMENTS: SEDIMENT LOAD

Arsenic
Copper
Iron
Lead
Manganese
Mercury
Molybdenum
Zinc

GROUP 7
POTABLE WATER PARAMETERS
(Required for public drinking water systems)

7 a - Monthly

Bacteria - Total Coliform

7 b - Annual

Arsenic
Barium
Cadmium
Chromium
Cyanide
Lead
Mercury
Nitrate
Selenium
Silver
Fluoride
Copper
Chloride
Iron
Manganese
Sulfate
TDS
Zinc
Sodium

GROUP 8
MACROINVERTEBRATE SAMPLING

Identification to species, if possible; spring, fall.

GROUP 9
FISH POPULATION SURVEY

Identification to species and count; data collected in the fall.

GROUP 10

Spawning gravel sediment sampling by USFS.
8 sieve sizes for analysis of spawning gravel suitability.

GROUP 11

Water level.

3.0 GENERAL PROCEDURES - SURFACE WATER

3.1 FIELD METHODS AND MATERIALS

The following parameters will be measured in the field on site, or during winter months, as soon as possible after surface sample collection to insure accurate results.

- o conductivity and temperature
- o pH
- o turbidity
- o air temperature

Conductivity, and water temperature will always be measured instream. Air temperature will be measured on site.

The following materials will be used in sample collection:

- o conductivity meter
- o pH meter and calibration buffers
- o turbidimeter
- o sample containers with labels
- o data forms and field notebook
- o distilled water
- o cooler(s) and ice packs or cubes
- o waterproof pen
- o thermometer

A dissolved oxygen meter will be available for use as necessary.

3.1.1 Calibration Requirements:

Field equipment will be maintained and regularly calibrated according to manufacturer's instructions.

1) pH meter - standardization required at least once monthly. Calibration with one appropriate buffer (pH 7, 9 or 10) before each set of continuous measurements is also required. These will be recorded in a permanent log book which is kept with the instrument.

2) Turbidimeter - calibration to known standard required before each sample measurement.

3) Conductivity meter - Semi-annual calibration check to known standard required.

4) Dissolved oxygen meter - when in use, complete calibration required before each series of measurements. Membrane replacement is necessary generally every 2-4 weeks.

All probes and sample beakers must be rinsed with distilled water before and after each sample measurement.

3.1.2 Sample Collection, Documentation & Preservation:

Surface water samples will be collected at each station according to the schedule contained herein (section 2.1). Sample containers will be labelled at the time of collection as follows:

<u>Cyprus Thompson Creek</u> :
Sample Name
Date: Time:
For: (analyses required)
Preservative
Initials of collector

The general procedure for obtaining samples at each sampling station will be as follows:

- o Read staff gauge (if applicable) to determine streamflow.
- o Check battery test switch on all field instruments before use and make sure they are properly calibrated as per section 3.1.1.
- o Take an instream conductivity and temperature reading by inserting probe directly in the stream.
- o Fill sample containers, after proper labelling, by the grab sampling method taking care to avoid contamination of bottles.*
- o Take an air temperature reading making sure the thermometer is not in direct sunlight.
- o Make field measurements of pH and turbidity, by vigorously shaking the unpreserved stream sample bottle and taking a 40ml. subsample.
- o Record all information (station, date, time), measurements, and observations on the appropriate field data form (Appendix A) and sign.

* Preservation of samples will be conducted according to the recommendations outlined in Appendix B.

3.1.3 Transportation:

After sample collection, samples will be packed in ice and transported from the field to the laboratory for analysis within the recommended specified holding times (see Appendix B). The logistics of transportation will be coordinated with the testing laboratory.

3.1.4 Record Keeping:

The original copy of the field data form which also indicates sample volume collected, analyses to be performed and preservative used will be sent with samples to the water testing laboratory (Appendix A). Copies will be retained for the Cyprus files. The back of this form also provides for a lab data report to be completed and signed by the laboratory supervisor and returned to Cyprus. Copies of the lab report will be retained by the laboratory for their records.

Water monitoring results will be kept on file with the Cyprus Environmental department.

3.2 FIELD METHODS & MATERIALS - GROUND WATER

This procedure will be the same as for surface water (Section 3.1) except that

- o conductivity and temperature will be measured on site from a sample beaker.
- o well sampling apparatus (generator to operate well pump, air compressor or bailers) are required.

3.2.1 Calibration Requirements:

Requirements will be the same as for surface water (Section 3.1.1).

3.2.2 Sample Collection:

Ground water samples will be collected at each station according to the schedule contained here (section 2.2, 2.3).

Labelling will be the same as for surface water (section 3.1.2) except that

- o depth to water level using a well sounding probe will be taken before sample collection.
- o the well will be pumped for a specified time to remove from 1-2 volumes of water (volume being equal to the area of the cased well times the water depth from surface to bottom of well) before a sample is taken.
- o pumping time will be recorded and sample will be prevented from aerating as much as possible during collection.
- o in the case of drinking water wells, samples will be taken from designated faucets, after allowing water to run for 2-3 minutes.

3.2.3 Transportation:

Same as for surface water samples (3.1.3).

3.2.4 Record Keeping:

Same as for surface water samples (3.1.4).

3.3 AQUATIC BIOLOGY METHODS

3.3.1 Sampling of benthic macroinvertebrate and fish populations in Squaw and Thompson Creeks will be continued. Specific methods and materials can be found in the 1982 and 1983 reports by Chadwick and Associates, "Aquatic Biological Survey of Thompson Creek and Squaw Creek".

3.3.2 Analysis:

Invertebrates will be identified to genus and species whenever possible. Community relationships and effect of mining, if any, will be discussed.

Fish will also be identified to species and will be measured, weighed and recorded in field book.

A current copy of the USGS Report will be sent to the biologist.

3.3.3 Reporting:

An annual report will be prepared, combining the macroinvertebrate and fish population studies. This report is presented to the interagency task force for annual review.

4.0 LABORATORY ANALYSIS AND PROCEDURES

Physical and chemical analysis will be conducted by an EPA approved and state certified laboratory and/or the Cyprus Analytical Laboratory using analytical methods described in Standard Methods for the Examination of Water and Wastewater, 15th edition, American Public Health Association, 1980. See Appendix C for a list of methods used by the current laboratory contracted by Cyprus. The laboratory will comply with record keeping (Section 3.2.4) and quality assurance procedures as described in the following section.

5.0 QUALITY ASSURANCE PROGRAM

In order to produce valid water quality data from the project area, basic quality control elements will be incorporated in both field and laboratory aspects of the monitoring program.

5.1 BASIC ELEMENTS INSURING QUALITY CONTROL

- o Calibration of field instruments - covered in Section 3.1.1.
- o Proper collection and preservation of samples - covered in Section 3.1.2.
- o Time-sensitive samples will be delivered as soon as possible to be analyzed by the lab within specified holding times (See Appendix C).
- o Transfer of custody and shipment - the field sampler is responsible for proper collection, preservation, packaging and dispatching samples to the laboratory with proper sample collection forms (Section 3.1.5).
- o United Parcel Service slips will be retained for verification of shipment of samples. In case of air delivery, verification will be by telephone.
- o Custody transferred to laboratory upon delivery of samples. Laboratory is then responsible for receiving, adequately storing, and minimal handling of samples.

5.2 QUALITY ASSURANCE SAMPLING

During the course of the Water Monitoring Program, additional (standard and duplicate) samples will be utilized to determine precision and accuracy of the methods used in the laboratory according to the following schedule:

- o Each quarter duplicate samples will be taken, on a rotating basis, from one of the water quality stations being monitored.
- o EPA Quality Control samples will be procured by the laboratory on a continual basis and analyzed as a check for accuracy.
- o As an intra-laboratory check, samples may be split on a regular basis and tested again one to two times as necessary to validate results.

Quality assurance procedures and data will be fully documented and retained for future reference. Field and laboratory personnel will keep complete and permanent records of all sampling and testing to satisfy legal requirements for potential enforcement or judicial proceedings.

6.0 REPORTING

Data will be compiled and available to agencies on a monthly basis. A Yearly summary will be prepared including Aquatic report and water quality data on analysis, storm events, etc. This report is submitted to the Interagency Task Force for review.

APPENDIX A

WATER QUALITY DATA FORMS

CYPRUS THOMPSON CREEK
WATER QUALITY MONITORING PROGRAM
FIELD DATA

Station ______________ Date Collected ______________ Time ______
Air Temperature ______ °F Weather ______________
Conductivity ______________ umhos/cm at 25°C Sample Temp ______ °C
pH ______________ Turbidity ______________ Staff Gauge ______
Flow Rate ______________
Person Conducting Sampling ______________ Signed
Samples Collected: Date Mailed to Lab ______________ Time ______

Analysis Group	Parameters to be Tested		Preservative Added	Collected		Sample Size
				Yes	No	
Physical Properties, Cations & Anions	Suspended Solids Alkalinity Hardness Calcium Chloride Magnesium Potassium	Silica Sodium Sulfate Sulfide TDS Xanthate	None			
Nutrients & ganics	Nitrogen-TKN - Nitrate - Nitrite - Ammonia	Phosphate Carbon-TOC	Sulfuric Acid (H_2SO_4)			
Other Nutrients	BOD	COD	None			
Biological	Total Coliform Bacteria Fecal Coliform Bacteria		Sodium Thiosulfate			
Trace Metals	Aluminum Arsenic Barium Cadmium Chromium Cobalt Copper Iron	Lead Manganese Mercury Molybdenum Nickel Selenium Silver Zinc	Nitric Acid (HNO_3)			
Other Organics	Cyanide		Sodium Hydroxide (NaOH)			

arks:

APPENDIX B

RECOMMENDATIONS FOR PRESERVATION SAMPLES

APPENDIX B

RECOMMENDATION FOR PRESERVATION OF WATER SAMPLES

Parameter	Vol. Req. (ml)	Container, Plastic or Glass	Preservative	Holding Time (3)
Alkalinity	100	P,G	Cool, 4°C	24 Hrs.
Arsenic	100	P,G	HNO_3 to pH < 2	6 Mos.
BOD	1000	P,G	Cool, 4°C	6 Hrs. (1)
COD	50	P,G	H_2SO_4 to pH < 2	7 Days
Chloride	50	P,G	None Req.	7 Days
Conductivity	50	P,G	Det. on site	No Holding
Cyanides	500	P,G	Cool, 4°C NaOH to pH 12	24 Hrs. 14 Days
Dissolved Oxygen	300	G only	Det. on site	No Holding
Hardness	100	P,G	Cool, 4°C HNO_3 to pH < 2	7 Days
Metals				
Dissolved	200	P,G	Filter on site HNO_3 to pH < 2	6 Mos.
Suspended	200	P,G	Filter on site	6 Mos.
Total	100	P,G	HNO_3 to pH < 2	6 Mos.
Mercury				
Dissolved	100	P,G	Filter HNO_3 to pH < 2	38 Days (Glass) 13 Days (Hard Plastic)
Total	100	P,G	HNO_3 to pH < 2	38 Days (Glass) 13 Days (Hard Plastic)

Appendix B (Continued)

Parameter	Vol. Req. (ml)	Container, Plastic or Glass	Preservative	Holding Time (3)
Nitrogen				
Ammonia	400	P,G	Cool, 4°C H_2SO_4 to pH < 2	28 Days
Kjeldahl total	500	P,G	Cool, 4°C H_2SO_4 to pH < 2	7 Days
Nitrate/ Nitrite	100	P,G	Cool, 4°C H_2SO_4 to pH < 2	24 Hrs. (2)
Oil & Grease	1000	G only	Cool, 4°C H_2SO_4 or HCl to pH < 2	24 Hrs.
Organic Carbon	25	P,G	Cool, 4°C H_2SO_4 to pH < 2	24 Hrs.
pH	25	P,G	Det. on site	6 Hrs. (1)
Phenolics	500	G only	Cool, 4°C H_2PO_4 to pH < 4 1.0 g $CuSO_4$/1	24 Hrs.
Phosphorus Ortho- Total	50	P,G	Cool, 4°C	7 Days
Selenium	50	P,G	HNO_2 to pH < 2	6 Mos.
Sulfate	50	P,G	Cool, 4°C	7 Days
Sulfide	100	P,G	Cool, 4°C Zinc Acetate	14 Days
Temperature	1000	P,G	Det. on site	No Holding
Turbidity	100	P,G	Det. on site	No Holding

Appendix B (Continued)

(1) If samples cannot be returned to the laboratory in less than 6 hours and holding time exceeds this limit, the final reported data should indicate the actual holding time.

(2) Mercuric chloride may be used as an alternate preservative at a concentration of 40 mg/l, especially if a longer holding time is required. However, the use of mercuric chloride is discourageed whenever possible.

(3) It has been shown that samples properly preserved may be held for extended periods beyond the recommended holding time.

APPENDIX C

METHODS USED FOR WATER ANALYSES

APPENDIX C
METHODS USED FOR WATER ANALYSES BY CODE
From Standard Methods for the Examination of Water and Wastewater, 15th edition, 1980, American Public Health Association

	Method Number		Method Number
Acidity	402	Molybdenum	303C
Alkalinity	403	Bromine	405
Aluminum	303C	Cobalt	303A or **
Arsenic	**	Nickel	303A or **
Barium	303C	Nitrogen-Ammonia	417A and 417E
Boron	404A	Nitrogen--Total Kjeldahl	420A and 420B
Cadmium	303A or **	Nitrogen--Nitrate	418C
Calcium	311C or 303A	Nitrogen--Nitrite	419
Carbon Dioxide	406A	Nitrogen--Organic	420
Chloride	407A	Orthophosphate	424F
Chlorine Residual	408E	Total Phosphate	424F
Chromium	303A or **	pH	423
Conductivity	205	Potassium	303A
Color	204A	Selenium	**
Copper	303A	Silica	303C
Cyanide	412D	Silver	303A
Fluoride	413B or 413C	Sodium	303A
Hardness	314B	Solids--Total	209A and 209B
Hex Chromium	312B	Solids--Volatile	209E
Hydrogen	427D	Solids--Suspended	209D
Iron	303A	Solids--Settleable	209F
Lead	303A or **	Sulfate	426B
Magnesium	303A	Sulfide	427B and 427D
Manganese	303A	Tannin & Lignin	513
Mercury	303F		

Appendix C (continued)

	Method Number
Temperature	212
TOC	505
Turbidity	214A
Zinc	303A
Carbonate	406C or 403
Bicarbonate	406C or 403
Oil & Grease	503A and 503C
BOD	507
COD	508A
Bacteria--Total Coliform	908A and 909A*
Bacteria--Fecal Coliform	908C and 909C*
Bacteria-Fecal Strep	910A and 910B*
Bacteria--Total	907

* Either method upon request

** Analysis by Graphite Furnance Technique EPA Method 206.2, 213.2, 218.2, 219.2, 239.2, 249.2, 270.2

This list was submitted by Analytical Laboratories of Boise, Idaho, who is currently contracted by Cyprus to perform most of the analyses.